THE
physical therapy REVIEW

34th Annual Conference
American Physical Therapy Association
Hotel Statler Detroit, Michigan
June 23-28, 1957

Physiological Basis of Electrical Stimulation of Human Muscle and Its Clinical Application — BOWMAN and SHAFFER

Therapeutic Indications for Pool Therapy — LOWMAN

Pulley Exercise Frame — KRAVIS and BURL

Case Report — KNOTT

Suggestions from the Field
DEAN
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Proposed Amendments to Code of Ethics

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Volume 37, Number 4 **April 1957**

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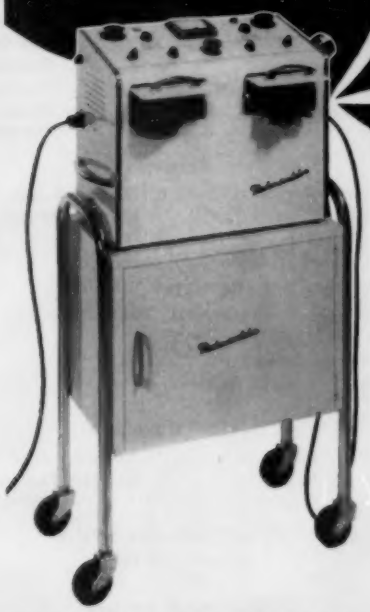

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Vol. 37 No. 4

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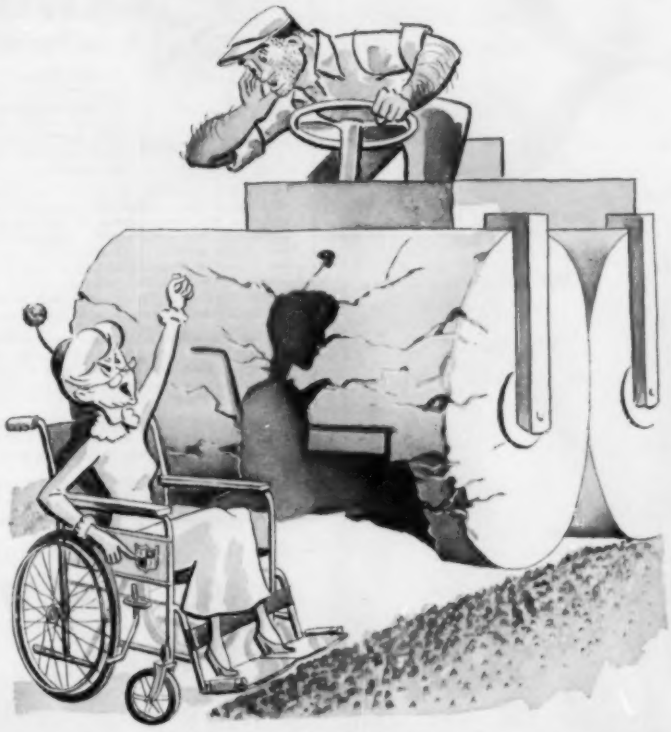

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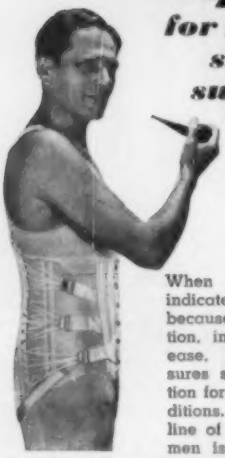

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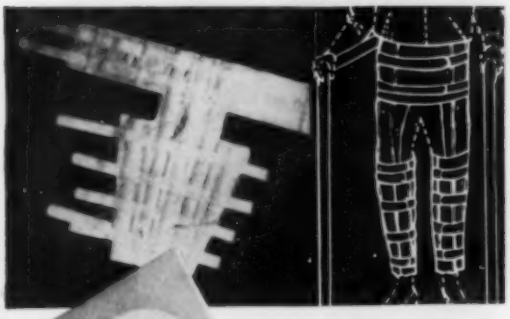

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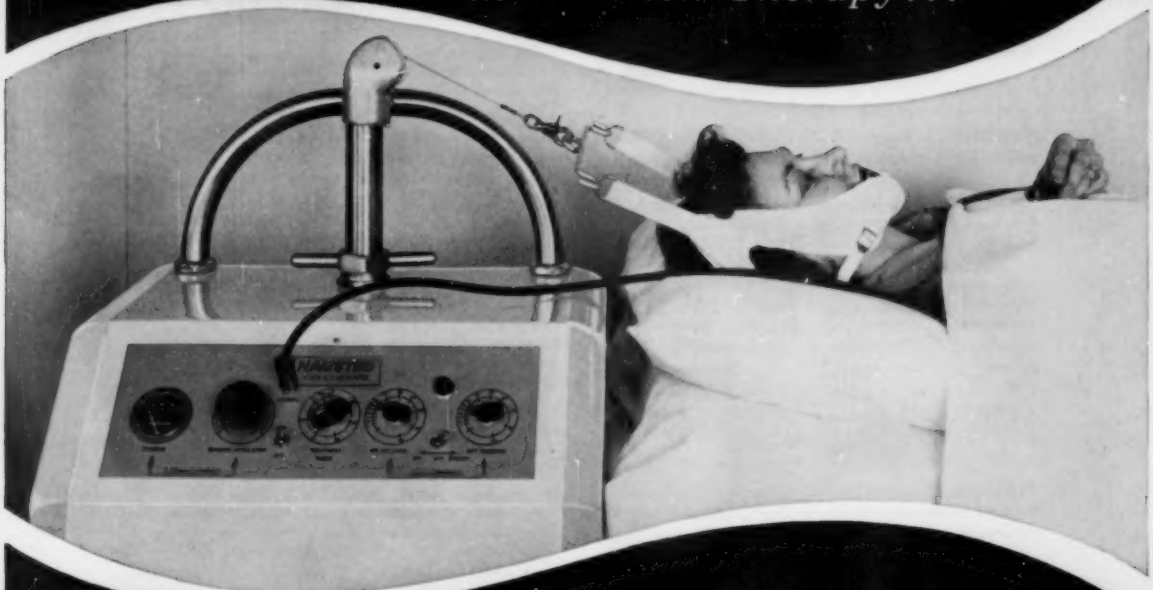

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Physical Therapy in the Care of Neuromuscular Disease	Georgia Warm Springs Foundation Warm Springs, Georgia	Robert L. Bennett, M.D. Medical Director Ga. Warm Springs Found. Warm Springs, Georgia	January April October
Advanced Course in Physical Rehabilitation Methods	New York University-Bellevue Medical Center & New York University School of Education	Mrs. Edith Lawton Director, Courses for Physical Therapists Institute of Physical Medicine and Rehabilitation 400 E. 34th Street, N.Y., N.Y.	April 29 — May 24, 1957
Principles of Rehabilitation	University of Pennsylvania & U. S. Office of Voc. Rehab.	Rehabilitation Center Hospital of the University of Pennsylvania Philadelphia 4, Pa.	April 22–26, 1957 June 17–21, 1957
Prosthetic Rehabilitation of Above-Knee Amputee	College of Engineering & Postgraduate Medical School New York University	Postgraduate Med. Sch. Prosthetic Education New York University 550 First Avenue New York, N. Y.	May 2–10, 1957 *P.T.'s in:* Mich., N. Ohio, W. Va. June 6–14, 1957 — Open
Advanced Dissection Anatomy for Therapists P.T.501(3)	Physical Therapy Dept. University of Southern Calif. University Park, Los Angeles 7	Charlotte W. Anderson Professor & Chairman of Dept. of Physical Therapy University of Southern Calif. University Park, Los Angeles 7	June 24 — August 2
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Principles and Practices of Geriatric Rehabilitation for Home, Hospital and Nursing Home	Dept. of Physical Medicine & Rehabilitation New York Medical College Metropolitan Medical Center Bird S. Coler Hospital Welfare Island New York 17, N. Y.	Dr. Ira Belmont, Executive Assistant Physical Medicine & Rehabilitation Dept. Bird S. Coler Hospital Welfare Island New York 17, N. Y.	April 22 — May 3
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Illustrations should be protected by cardboard and the name of author and figure number written with soft pencil on the back. If *photographs* are used, sharp black and white prints on glossy paper are required, avoid distracting backgrounds. Graphs, charts, and line figures drawn with india ink on heavy white paper are necessary for good reproductions. Letters and figures should be large enough so that they will be readable when reduced for publication. Tables are reproduced more legibly when the carbon is reversed and typing occurs on both sides of the paper.

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Birtcher

MORE ON BOOKS AND THINGS

Just finished reading *The Last Angry Man* by Gerald Green (January selection of Book of Month Club, published by Charles Scribner's Sons). It is a swell yarn about a G.P. practicing in the slums of Brooklyn from 1912 until now. Samuel Abelman, M.D., I suppose, is really a composite of several physicians. He is crochety, mean, vulgar, sincere, honest, loving and lovable, and at the same time, a square in today's slangy sense, but he is also an excellent medical man. They say anything can happen in Brooklyn and does. Try this on for size!

For more serious moments—I have been studying *Electrodiagnosis and Electromyography*, ably edited and partially written by the eminent physiatrist, Sidney Licht, M.D. About eleven most competent contributors present as many chapters on various facets of the subject. Whereas electrodiagnosis belongs rightfully in the hands of the M.D., I suspect the informed therapist can be of enormous help to his or her chief at times in this work. One could certainly not go wrong by learning more than his daily stint requires. This book isn't easy going... at least, not for me. I would call it, however, a *"must"* for any up-and-coming P.T.

— — — — O — — — —

We are selling lots of Ultrasonic machines these days, particularly our new Megason V ——— with the new 5-Way Adjustable Position Transducer. Recently and unaccountably, there has been an upsurge in sales of our Myosynchron... that is our trade name for our low voltage electromuscle stimulator. Just why the sudden increase, I do not know. Perhaps someone has developed some new methods of employing these currents and the word is going around via the grapevine.

I am constantly asked by therapists who are employed in various federal, state, and county institutions why their respective departments do not happen to have some certain device of mine. Most of these items are procured by bids for various quantities. Although we sell quite a few of each of our various items, by no means are we always the successful bidder as we are simply not going to bid at prices that won't give us a reasonable profit or permit us to pay our engineers and many other workers what they are entitled to. Usually, however, any department can get what it particularly specifies. Regardless of the name plate, however, on any equipment the final end result, the practice of good therapy, is up to you.

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Physiological Basis of Electrical Stimulation of Human Muscle and Its Clinical Application

Harry D. Bouman, M.D., and Kathryn J. Shaffer, M.S.

Introduction

The selection of electrodiagnostic methods and the selection of electrical currents for therapeutic purposes is sometimes extremely confusing. There is at present a large number of machines on the market each with different types of current, and each with different claims for effectiveness of that particular type of current. Electrodiagnostic methods are presented in a great variety, and considerable claims are made for their validity. From this confusing array of possibilities, a choice has to be made as to the most adequate current to use in electrotherapy or for the diagnostic procedure. It will be the aim of this presentation to show that it is quite possible to analyze the problem and to make this confusion disappear by going back to the fundamental physiological principles underlying electrodiagnosis and electrotherapy.

It should be realized that in both electrodiagnosis and electrotherapy the aim is to obtain a contraction of the muscle being stimulated. In electrodiagnosis the quantitative properties of the current used provide the investigator with his electrodiagnostic data. In electrotherapy of denervated muscle it is only by strong and vigorous muscle contractions as a result of electrical stimulation that muscle atrophy can be avoided. In electrical stimulation of the innervated muscle used as an aid to muscle reeducation it is again essential to obtain a muscle contraction. The question as to what current to use in electrodiagnosis and electrotherapy boils down then in both cases to the question of which conditions a current must fulfill in order to be effective in producing contractions. In other words, the confusing problem of electrodiagnosis and electrotherapy comes down to the basic physiology of muscle excitation about which at least in animal experiments a good deal is known. These simple basic physiological facts are complicated because in the human being electrical excitation has to be done through the skin and with adjacent tissues short circuiting the muscle under investigation. We shall try to show some of the complications which occur as the result of this, and at least some of the ways and means to avoid them. Before we do this however, we will discuss the basic clinical problems of electrodes and electrode placement.

The Clinical Application of Electrodes, and the Evaluation of the Contraction

We shall review briefly a few of the important fundamentals of electrical stimulation and electrical diagnosis from a very practical standpoint. These points, such as electrodes, electrode placement, and observation of the contraction are the same for all electrodiagnostic procedures. Even though they are generally well known, many

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errors can result when inadequate attention is paid to them.

Electrodes

The electric current is introduced at one area of the patient's skin and leaves at another. Therefore, two electrical contacts or electrodes are necessary, usually a larger one or dispersive electrode, and a smaller one, the active or stimulating electrode. These are available in many sizes, shapes, and types. In the literature it is found that nonpolarizable electrodes, silica gel electrodes, and others are sometimes used. In our clinic and in the experiments to be discussed we are using standard electrodes, and we have used these throughout our work. The active electrode is 1 inch in diameter and the dispersive electrode is 4 inches by 6 inches. An important and often neglected point is to be sure that the electrodes have been soaked long enough. In one study which we made a few years ago, a marked difference was observed when the electrodes were soaked for only 10 minutes, and when they were soaked for 24 hours. The experiments consisted in the measurement of total impedance and phase angle of human skin under clinical conditions. It was found that with electrodes soaked for only 10 minutes (a practice which is all too frequent in many clinical situations) completely erratic results were obtained, and an abnormally extended range of impedance values was obtained. After soaking the electrodes for 24 hours the results became constant enough to provide reliable data. The usual clinical electrodes were used also in these experiments.

There have been many reports on studies made on the preparation of the skin for electrical stimulation or electrical testing. The use of benzocaine in calamine lotion was reported as being successful in permitting greater intensity of current and therefore making it possible to obtain stronger contractions in the muscles being stimulated[13]. Another interesting study reported a significant effect in lowering the skin resistance by the combination of washing the skin well with soap and water, heating the part for 10 minutes with infrared and producing 6 to 8 strong contractions of the muscle with a 300 msec. pulse, before starting the test[18]. Others report on the use of xylocaine, novocaine, procaine, and electrode jelly. Still others suggest the possibility of giving the patient a sedative to decrease the over-all pain level prior to electrodiagnostic or therapeutic procedures. However, it seems almost routine that the part be heated and that the skin be wet under the electrode.

Placement of the electrodes

Electrical current can seriously interfere with the normal function of the heart and can lead to fibrillation. While it is true that electrodiagnostic currents are usually not very strong and that little if any evidence of such damage is known to occur in the clinic, it would seem to be a wise precaution to apply the electrodes in such a way that the path of the stimulating current avoids the heart area.

Electrodes may be applied in two ways. The unipolar method is most frequently used, with the active electrode on the motor point, and the dispersive electrode on some other part of the body. In the bipolar method, electrodes of equal size are usually applied so as to include the entire length of the muscle belly. In this way the density of the current is located only where it is needed and it is hoped that, within certain limits, this current strength will not spread to other muscle groups. It is often used when it has been difficult to find a motor point or when contractions of muscles are masked by spread of the current to other muscles. Electrodes of equal size are also used in group stimulation, when an entire extremity or a large group of muscles are to be treated. In this case, the electrodes are usually placed at opposite ends of the extremity. In electrical testing, a standard placement of electrodes should be followed, so that constant results will be maintained. Also, the electrodes should be left in place until a test has been completed.

In the unipolar stimulating technic the active electrode should always be placed on the motor point of the muscle. It is extremely important that an accurate motor point be found. The motor point of a muscle is that point on the surface over the entrance of the motor nerve into the muscle. The motor point of the nerve is that point where the nerve is nearest to the surface. Motor point charts have been adequately worked out, on the basis especially of the extensive studies of Bourguignon[4]. Such motor point charts are commercially available from many sources. They show the motor points of the principal muscles and the main nerves. The exact location of each motor point will vary slightly from patient to patient, but the relative position follows a fairly fixed pattern. It has been reported that the displacement of the electrode 2 to 3 cm. from the motor point may increase the rheobase by 25 per cent and the chronaxie by 500 per cent[4]. With denervation, the actual motor point of a muscle as defined anatomically disappears. The indirect stimulation by the motor nerve, is replaced

by direct stimulation of the muscle fibers, and the apparent motor point is now the point of highest sensitivity. Therefore, when the active electrode is moved distally to where the muscle fibers converge to join the tendon, the current will actually reach a greater number of muscle fibers, with greater intensity, than nearer the center of the muscle belly. Also, a larger number of fibers traversed by the current between the active and dispersive electrodes, results in a stronger contraction. This is called longitudinal reaction.

Observation of the contraction

In electrical muscle testing the part should be in good light. Many times the effect of a shadow will help in detecting a minimal contraction. Where muscles insert by easily palpable tendons, it may be more accurate to palpate for the tendon movement than to watch for a muscle contraction, as movement of the tendon may be palpable before a contraction is visible. And, the contraction should be as close to minimal as possible, otherwise abnormal values of diagnostic constants may be found (see below).

THE STIMULATING CURRENT—BASIC CONDITIONS

Discussion of the stimulating current should be based on a discussion of the basic physiological conditions which determine the selection of an electric current for electrodiagnostic or electrotherapeutic purposes. As we have mentioned before, the question that really has to be raised is what conditions must a current fulfill in order to excite an excitable tissue. It is well known from physiological data that there are three such factors: 1) the current must have a certain intensity, 2) the current must last a certain length of time, and 3) the current must reach its maximum intensity with an adequate speed of rise. It is these three basic factors that determine the excitatory effect of an electric current, and on them all our electrodiagnostic and electrotherapeutic considerations are based. It should always be realized that application of a current through the human skin and adjacent tissue short circuits may alter the basic physiological data.

THE FIRST FACTOR OF EXCITATION—STRENGTH OF CURRENT

As one gradually increases the current strength of a stimulating current there comes a time when suddenly the muscle responds with a contraction or the nerve responds with a propagated impulse. This current is called the threshold and if the other two conditions to be discussed later (namely duration and speed of rise) have been adequately taken care of, this threshold for currents of very long duration and very steep rise is called the rheobase. The sharp discontinuity between no response below threshold and response above threshold is characteristic of excitation phenomena. It is made even more prominent by the "all-or-none" law. If we stimulate a single muscle fiber or a single nerve fiber it has been shown repeatedly that as soon as the stimulus reaches threshold the response is complete and will not increase any further when the current strength is increased. This is called all-or-none response.

The question can be raised as to what then is responsible for the gradual increase in muscle contraction strength with an increased electrical stimulus, or in voluntary motion what makes the difference in muscle contraction strength, if an individual muscle fiber can respond only by an all-or-none response. In electrical stimulation it can be shown that the threshold of different muscle and nerve fibers is not the same and that with an increase of stimulus strength more fibers will respond, until at a certain level of current strength all muscle fibers respond and the muscle performs a maximum contraction. The ratio between the current strength needed for a maximum contraction and the current strength needed for a minimum contraction is called the "excitation range."[1] It is interesting to note that for the stimulation of a frog sciatic nerve this excitation range is only 1.3. This means that it takes only 1.3 times as much current to obtain a maximum contraction as it does to obtain a minimum contraction. For the frog muscle, however, the excitation range is considerably larger, normally with long lasting currents of the order of magnitude of five to ten. This has an important clinical conclusion; namely, that if one stimulates a muscle through its nerve, a slight increase in current will give a marked increase in contraction, while if one stimulates the muscle directly this increase in contraction strength with increase in current will be much less marked, due to the increased excitation range. This is one of the reasons why clinical electrical stimulation should always be done through the motor point because the threshold becomes much more sharply defined. Experiments on the excitation range lead to other conclusions of clinical importance which will be discussed below.

It is also well known that in voluntary move-

ment there are other ways by which the strength of muscle contraction can be increased besides the increase of the number of fibers that are active. There is in the first place the well known physiological fact that with an increase in voluntary muscle strength there is an increase in the number of impulses sent down the motor nerve which through contraction summation leads to an increase in contraction strength. However, there is a third possibility of increasing contraction strength for a short period of time. If one loads a human muscle with a maximum load so that all muscle fibers are contracting and the impulse rate is as high as it can be obtained, it is still possible to get an increase in muscle contraction strength. The integrated electromyogram shows under those circumstances a maximum excursion, and if one asks the subject to perform a short additional movement he will easily do so. During this contraction the integrated electromyogram shows no further increase in electricity generated which in physiological terms means no further increase in the total amount of activity present in the muscle. If one looks at an oscillographic recording of the electromyogram, however, there is a striking sudden synchronization of muscle fibers[17]. While previously the different muscle fibers showed considerable asynchronism in order to maintain the contraction, they now suddenly synchronize to give one short and intense burst of activity[2]. Clinically this phenomenon is again of importance because it helps to explain the difference between the maintained muscle strength and the strength of sudden ballistic movements. It also at least gives a possibility to explain why muscle damage can occur more easily with sudden very strong exertions than with maintained contractions because, in these strong exertions the momentary power exerted by the muscle can be considerably above that of the maintained contraction.

It has been mentioned that below the threshold of excitation no response occurs. While this is undoubtedly correct as far as the contraction of the muscle and the propagated response of nerve is concerned, it would not be correct to say that below the threshold nothing occurs. Work from many laboratories has shown that there is a subthreshold change in excitability which can be measured by measuring the difference between the absolute threshold of a nerve and the threshold while another subthreshold stimulus is passing through it[7]. Under certain circumstances such a subthreshold phenomenon can actually build itself up to threshold stimulation. This phenomenon is fairly closely related to the factor of accommodation of nerve which will be discussed later.

Experiments on the excitation range mentioned above give us some further insight into the problems of threshold stimulation of the different fibers in a muscle[1]. The reason why this range is much larger for a muscle than for the nerve may be due to two factors. One is an actual larger range of the thresholds of muscle fibers as compared to nerve fibers, the other is the fact that the current spread has to be much wider on stimulation of a muscle directly than on stimulation of the fibers in a nerve trunk. It has been shown that the range of excitation depends on a number of factors. The factor which is of most importance here is that it depends on the duration of the stimulus. If one compares data obtained with a long lasting stimulus with those obtained with a stimulus of short duration (5 msec.) it is found that this has hardly any influence on the excitation range of a nerve. On the other hand in direct stimulation of muscle the excitation range is increased many times.

It can be shown that this increase in excitation range is largely due to the difference in spread of a long lasting current and the spread of a current of short duration in the bulk of a muscle. This phenomenon again depends on changes in current resistance for long lasting and short lasting currents. It is found that the impedance for short rectangular shocks differs markedly from that for long lasting rectangular shocks if the measurement is made by a physiological substitution method. Again it can be shown that these changes are different in different directions of the muscle, for instance, entirely different in longitudinal direction than in transverse direction of the muscle.

These data have considerable importance in the application of currents for electrodiagnostic purposes. Obviously not all the current which is applied to the human muscle goes through the muscle which is actually being stimulated. There are tissue short circuits both in the muscle itself and in surrounding tissues. From the range of excitation experiments it becomes clear that the value of these short circuits depends not only on the duration of the stimulus but also on the direction in which the stimulus passes through the short circuits. It can be shown that these results are due to tissue polarization, because by addition of polarizing currents in the same direction as the stimulating current the phenomena obtained at short duration can be changed to those obtained at long duration. A polarizing current in the opposite direction of the stimulat-

ing current has the opposite effect. This is a phenomenon that is a major complication in evaluation of electrodiognostic methods, namely, the existence of tissue short circuits whose magnitude depends on the duration of the stimulus and the direction in which the current passes through the tissues. It is not easy to evaluate from electrodiognostic experiments how serious these tissue short circuits really are. However, one can get an indication of the magnitude of this phenomenon from electromyography. It is well known that the action potential of a single muscle fiber is of the order of magnitude of 100 millivolts. The electromyogram as led off from the skin, however, is usually not more than approximately 100 microvolts or 1/1000 of the potential of one single muscle fiber. With modern high impedance amplifiers skin resistance explains only a small portion of this discrepancy. Most of the disappearance of the electromyographic current is due to tissue short circuits. This again has considerable clinical importance.

Many investigators have reported on the fact that the electromyogram cannot well be used as a measure of muscle contraction strength even in the so-called "integrated technic." Those who have done measurements on the accuracy of the electromyogram as it relates to muscle strength have come up with a limit of error of approximately 700 per cent which is certainly much higher than, for instance, a well done manual muscle chart. It has been found difficult to explain this very large error in clinical electromyography. However, if one realizes that approximately only one tenth of one per cent of the original action potential shows up in the electromyogram and 99.9 per cent gets lost in tissue short circuits, a limit of error in the electromyogram of 700 per cent means a change in tissue short circuits of only approximately seven tenths of one per cent. This figure of course is entirely reasonable. In fact, one might say that the tissue short circuits remain remarkably constant. It is only because such a large percentage of the electromyogram disappears in the tissue short circuits that a very small change in these short circuits makes a major change in the electromyogram.

It should be realized that while it is more difficult to measure, undoubtedly a similar leakage of current occurs in electrodiagnostic procedures and that again the actual stimulating current is only a small portion of the total applied current. Experiments on the threshold of single muscle fibers indicate similar results. It should then be realized that if the impedance of these tissue shunts varies in a different way from that of the muscle that is being stimulated (for instance, as a function of duration of the stimulus) the resulting stimulation of the muscle can no longer be considered proportional to the total current applied. It is, for example, entirely reasonable to assume that in a stimulus of short duration an entirely different proportion passes through the muscle to be stimulated than with a stimulus of long duration. Some of the problems in clinical electrodiagnosis are the result of this phenomenon.

THE POLARITY FORMULA

Another problem related to the current sensitivity of muscle and nerve which has created confusion even in recent monographs is the problem of the so-called "polar formula." We shall first discuss the clinical phenomenon as used in routine electrodiagnosis. When using a direct current, with a make and break key or an interrupted direct current, emphasis has been placed on the fact that the negative direct current is more effective than the positive direct current. The polar formula is mentioned frequently, as is the fact that the reversal of the polar formula is indicative of denervation. The polar formula is generally given as follows:

$$CCC > ACC > AOC > COC$$

Using the same intensity of stimulating current, it indicates that the Cathode Closing Contraction or the make of the negative current will produce a greater contraction than the Anode Closing Contraction or the make of the positive current. This in turn will produce a greater contraction than the Anode Opening Contraction or the break of the positive current, and it in turn will produce a greater contraction than the Cathode Opening Contraction or the break of the negative current. Putting the same thing in a different way, the polar formula means that the threshold is lowest at closure of cathodal current and is higher at closing of an anodal current, higher again at opening of an anodal current and highest at the opening of a cathodal current—at the active electrode. The reversal of the polar formula was at one time considered an important adjunct to electrical diagnosis. Now, we hear that it is found to be variable and unreliable, and that it has no place in electrical diagnosis.

The physiological answer to the problem of stimulation at different poles is again an extremely simple one. Excitation at the make of a current occurs exclusively at the cathode. At the

break of the current excitation occurs exclusively at the anode. The evidence for this is overwhelming. If we limit our discussion to the closing excitation and stimulation of a nerve it is easy to show that a drop of anesthetic applied at the cathode increases the threshold of stimulation while a similar drop at the anode does not. It is possible to show that a change in temperature at the cathode changes the time constant of excitation and at the anode it does not. Finally as shown in figure 1 if one compares the time delay between excitation and initiation in the contraction on the left hand figure and on the right hand figure, the difference between the time delays is exactly the time that it takes the impulse to travel from the upper electrode to the lower electrode. Physiologically the fact that at the make of a current excitation occurs only at the cathode and at the break of a current only at the anode is established beyond a shadow of a doubt for all excitable tissues. Yet, clinically we talk about anode closing excitation and cathode opening excitation. The conclusion then is that these two types of excitation have no physiological basis and the question is on what are they based.

Figure 2 shows in diagrammatic form the clinical use of cathode stimulation and anode stimulation of a nerve in the human arm. In the upper figure, excitation at the make of the current occurs under the active electrode. In the lower figure, however, excitation cannot occur under the active electrode but occurs where the current leaves the nerve. In other words, our so-called "anodal closing contraction" is not an anodal stimulation at all. It is still a cathodal stimulation which occurs over the area where the current leaves the nerve. This area is much larger than the area under the cathode in the upper figure and therefore the current density is smaller and the threshold is higher. The fact that an anode closing contraction has a higher threshold than a cathode closing contraction simply means that in the lower experiment cathodal excitation occurs at the place where the current density is less. For opening stimulation the picture reverses and a similar argument holds. The clinical cathode opening and anode opening stimulation therefore are not based on physiological properties but are based on the anatomical position of the nerve in the surrounding tissues.

When the nerve degenerates these differences become much less pronounced and the difference between anode and cathode closing contraction and anode and cathode opening contraction should essentially disappear. Actually this is what one finds most frequently in the clinic. The "reversal of polar formula" which is not found anywhere near as often as one is made to believe is simply due to an unusual current spread after degeneration of the nerve, which occasionally makes for a higher density when the current leaves the muscle at the cathode. This can occur when the anode is the active electrode and we find the "reversal of polar formula." Also a result of anatomical considerations is the fact that the motor point moves close to the tendon after the nerve is degenerated. This again simply means that excitation occurs at the level of highest density of the current.

The second condition which a current must fulfill in order to be effective as a stimulus is duration. If one shortens the duration of a rheobase current without altering the intensity there comes a time when this current is no longer effective as a stimulus even though the intensity has not been altered. In frog gastrocnemius muscle and in human muscles these durations are very short, of the order of magnitude of a few milliseconds. It was first discovered by Hoorweg and Weiss on much slower muscles such as the urether of the rabbit and rings of stomach muscles. Qualitatively, however, the same condition holds for any excitable tissue. The important thing is that it is possible to compensate for this lack of duration by an increase in intensity. In other words if the duration is decreased to the point of ineffectiveness, the effectiveness of the current can be restored by an increase in intensity. If then the duration is again decreased the current again loses its effectiveness, but again the effectiveness can be restored by an increase in intensity and so forth and so forth.

Out of this develops then a relation between the duration of the current and the intensity which is still just effective at that particular duration. This curve is called the strength-duration curve or time-intensity curve of electrical excitation and expresses the quantitative relationships of the second factor of excitation. It should be stated at once that every excitable tissue has such a strength-duration curve, only the qualitative values differ vastly from excitable tissue to excitable tissue. The curve is shown in figure 3. Lapicque [13] who has done more of the fundamental work on the second factor of excitation than almost any other physiologist, showed that in first approximation this curve can be expressed by the mathematical formula $I = a + \frac{b}{t}$. In this I is the intensity of the current, t is the duration, and a and b are constant parameters. A curve

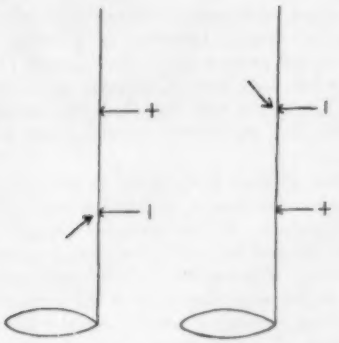

Figure 1. Stimulation of the nerve muscle preparation.

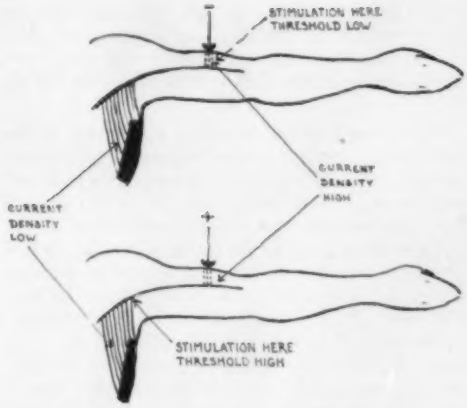

Figure 2. Stimulation of a nerve in the human arm with different polarity of the active electrode.

expressed by this formula has some unusual properties. It approaches asymptotically a line expressed by $I = a$. In other words there is a time then when the duration is so long that further increase in duration does not produce an appreciable reduction in the threshold. This duration has been called the utilization time. Also, this curve (and let it be repeated that this is a gross approximation) is a hyperbola and the complete curve is known from the formula as soon as two points on the curve are known, from which it is possible to calculate the parameters a and b. One point on the curve we already know. It is the rheobase which is the minimum strength for currents of a duration longer than the utilization time. Therefore, one other point on the curve will characterize the entire curve. Lapicque chose for that the minimum duration of a current of twice the rheobasic strength and called it the chronaxy.

The choice of twice the rheobasic strength is not a haphazard one. It is related to a simple mathematical analysis of Lapicque's approximate formula. If we substitute in the formula very large values of t, the resolved formula becomes $I = a$. In other words, the parameter a is the rheobase. If we now substitute for I the value $2a$, the formula becomes $2a = a + \frac{b}{t}$, or $a = \frac{b}{t}$, or again $t = \frac{b}{a}$. By definition this time (being the minimum time needed for twice the rheobasic strength) is the chronaxy and in Lapicque's formula the chronaxy then is the ratio of the two parameters, while the rheobase is the same as one of the two parameters. It should be pointed out again that this is an approximate formula. A. V. Hill has given a much more adequate mathematical analysis of this process and in doing so has calculated a factor K which again expresses the curvature of Hill's curve [12]. Obviously this factor K should be closely related to the chronaxy. In fact, it was found mathematically that chronaxy = 0.693 K. From Lapicque's analysis of the problem one might then be tempted to draw the conclusion that if one knows the rheobase and the chronaxy, the entire time intensity curve and therefore the entire excitability of the muscle as it relates to the factors of strength and duration is established.

Clinically at least two conditions arise which have proven quite disturbing in the application of chronaxy. The first one is that one must be dealing with one single excitable tissue. If there is more than one tissue involved, one would of course find double strength-duration curves, one part belonging to the slow and one part to the fast part of the tissue. It is obvious that under those circumstances a simple chronaxy and rheobase determination does no longer determine the entire curve. Such tissues have indeed been described and double chronaxies have been found in certain animal muscles.[3] Of clinical importance is the fact that if in one muscle one meets a mixture of innervated and denervated fibers there is also a double strength-duration curve, and a simple chronaxy determination is no longer adequate. Such an occurrence is quite frequent (e.g., in poliomyelitis) and Pollock [15] has pointed out that when such mixtures exist only the com-

plete determination of the strength-duration curve, which as the clinician knows is a time consuming and exact procedure, will give adequate data as to the first two factors of excitability.

The second factor which is disturbing is the fact that in clinical electrodiagnosis and electrotherapy, stimulation occurs through the skin and with adjacent tissue short circuits. It has already been pointed out that a large percentage of the current leaks away in these short circuits. It has also been pointed out that the spread of the currents, and with that the portion of the total current that goes through the stimulated muscle, varies a good deal with the duration of the stimulus. In other words with a very short stimulus either considerably more or considerably less of the total current may pass through the muscle to be stimulated than with currents of long duration. A careful analysis of the current spread in an individual case is difficult to do and exceedingly time consuming, if at all possible. This is one of the reasons why clinical determinations of chronaxy have not proven anywhere near as accurate as one could expect from physiological predictions and why many experienced electrodiagnosticians feel that unless a change in chronaxy of at least 10 times is found, little clinical significance can be attributed to this finding.

CLINICAL APPLICATION OF THE FIRST TWO FACTORS OF EXCITATION

A large number of clinical electrodiagnostic tests find their physiological basis in the first two factors of excitation: intensity (threshold), and duration. We will discuss the R.D. test, chronaxy, and the strength-duration curve from a practical clinical standpoint.

R.D. test

The R.D. or reaction of degeneration, sometimes called Erb's test is also referred to as the galvanic-faradic test. In this test two different currents are used, one consisting of short pulses and one consisting of long pulses. Faradic current is the classical current of short pulses. This is sometimes called a tetanizing current. The faradic current is at the present time often replaced by an alternating current of high frequency. The galvanic current or direct current is the current of long pulses. Each pulse must be at least 0.1 second long. In normal muscle the faradic current elicits a tetanic contraction during its entire flow. The galvanic current elicits a brisk single contraction when suddenly made. Disease or trauma resulting in a lesion of the lower motor neuron will, after about 14 days, cause some well known changes in these reactions. The nerve will have lost its conductivity, and therefore an altered muscle alone is being stimulated.

In full or total R.D. there is no response to faradic current that is, within the pain tolerance of the patient. If the intensity should be increased beyond the pain tolerance, a contraction may occur. The reason for this phenomenon is found in the short duration of the faradic pulse. It is strong enough to rise above the time-intensity curve of innervated muscle. In denervated muscle, however, the time-intensity curve is displaced towards the right. This means that for the same duration much higher intensities are needed in order to obtain an effective stimulus. Within the pain tolerance of the patient (and the output available from the stimulator) this is not possible. There is in a full R.D. a response to galvanic current if the duration of this current is long enough (300 msec, for instance). However, the response is slow and sluggish, possibly due in part to a slowing down of the contractile process in muscles, which accompanies the slowing down of the excitatory process. However, this may also be explained by the fact that at first the muscle fibers directly under the electrode are being stimulated, the contraction wave then spreads to the other fibers causing a slow, wormlike contraction. The motor point has also disappeared, and the greatest response of the muscle is apparent when the active electrode is placed over the muscle toward the tendon of insertion where the density of the stimulating current is highest.

R.D. may be classified as full, partial, or absolute; however, in actual practice, there is seldom this clearcut classification. An absolute R.D. indicates absolutely no response to any current in either nerve or muscle. It represents the final stage of a previously full R.D. and has an unfavorable prognosis. Results which indicate an absolute R.D. are often meaningless when found in testing the muscle for the first time and, certainly, no important conclusions should be drawn from such a finding. These results may be due to edema, a very high skin resistance, or even a loose electrode. The apparatus certainly should be checked, and it would be much better to repeat the test later before definitely classifying an R.D. as absolute.

An R.D. test is a qualitative test only. It denotes a lesion of the lower motor neuron, it indicates whether or not the nerve is intact and may

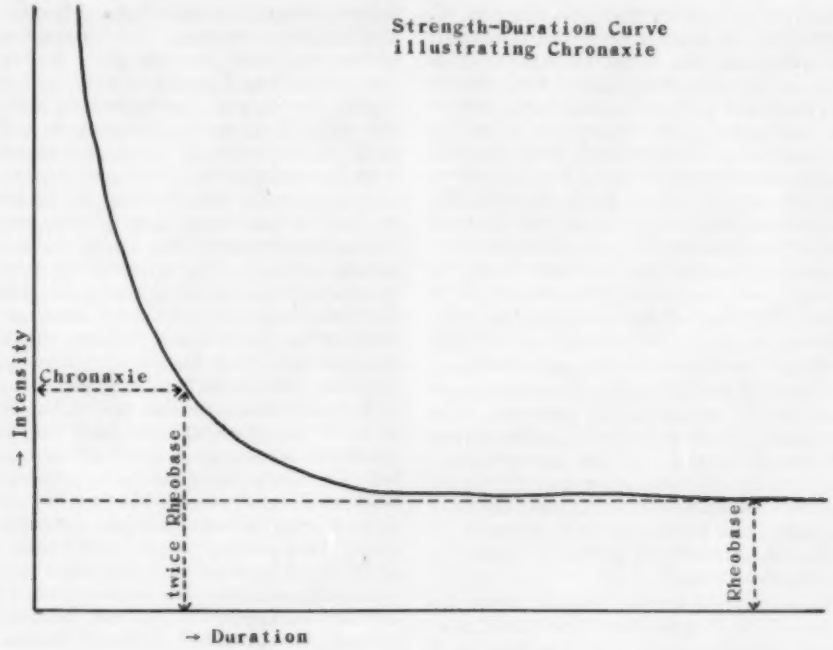

Figure 3. Strength-duration curve.

indicate the level of the lesion. The polar response was at one time a part of the R.D. test, but is now for the most part disregarded (see above). If during an R.D. test it is found that either the response is not really sluggish, or if the faradic response is present the result can be classified as a partial R.D. This can be due to a mixture of innervated and denervated fibers in the same muscle, or to the fact that the stages of denervation have not developed completely. Such a finding should always be interpreted with great care and only in the light of the total neurological findings in the individual case.

Chronaxy

We have already discussed the physiological definition of chronaxy. It is again based on the first two factors of excitation: intensity of the stimulus, and duration of the stimulus. Very briefly, the method of obtaining chronaxy is as follows: 1) find the motor point by using a galvanic current with a pulse of at least 300 msec.; 2) find the rheobase or minimal current strength needed to obtain a contraction in ma. again with a long lasting pulse (300 msec.); 3) double the rheobase—this is automatic in most commercial instruments by merely switching from rheobase to chronaxy; 4) starting at zero, increase the duration of the stimulus until the standard or minimal contraction is obtained; 5) this duration then, is the chronaxy. It is measured in msec. and therefore becomes a quantitative measurement of excitability; whereas, the R. D. test is only a qualitative test of muscle excitability. It should be realized however that basically the determination of chronaxy and the R.D. test measure the same thing; namely, the fact that in a denervated muscle the response to stimuli of short duration is very markedly reduced while the response to long lasting stimuli is very much less reduced.

The use of chronaxy has been criticized because of the difficulty in reproducing results. Recent studies have been made on this problem [5, 6]. Reports state that there may be a slight rise in threshold when the skin temperature falls, when the skin dries, when edema is present, or with a larger electrode. These factors have little influence on chronaxy, but the lower the threshold,

the more comfortable the current. However, the position of the stimulating electrode, particularly in the smaller muscles, is the main cause of inaccuracy, as was mentioned earlier in the discussion of the motor point. The position of the dispersive electrode is also important. When the distance between the active and dispersive electrodes becomes less, the resistance in the patient circuit falls, and the chronaxy is changed. The distance between the electrodes should be standardized. For instance, when the dispersive electrode is applied to the opposite limb (to the one being tested) the resistance of the patient circuit is about 1000 ohms. It has been suggested that this distance become standardized in an effort to maintain as constant a resistance as possible.

As in the test for R.D., when the nerve supply is intact, we are measuring the chronaxy of the nerve, sometimes referred to as the gamma curve. In denervated muscle, we are measuring the chronaxy of the denervated muscle itself, or the alpha curve. In other words, the short chronaxy of normally innervated muscle is replaced by a lengthened chronaxy of 10 to 100 times the normal, in denervation.

There are tables of the normal values for chronaxy of different muscles. The values, however, vary with different types of apparatus used, and with electrode placement. Therefore, it is important to follow a standard technic, as reported. Some muscles are in a high value group, others are in a low value group. Chronaxy values are closely alike for muscles of the same segment with similar function. Proximal segment muscles tend to have a lower chronaxy than distal segment muscles. Anterior muscles tend to have a lower chronaxy than posterior muscles in the same limb segment. Normally, the chronaxy is in the order of magnitude of 0.1 msec. Anything over about 1.0 msec. is considered pathologically significant.

The strength-duration curve

In both electrodiagnostic methods discussed so far a great difficulty results from the partial lesion. In these, chronaxy has little meaning as an exact index of muscle excitability and may be misleading. Chronaxy is just one point on the strength-duration curve, it is either that of normal fibers or that of completely denervated fibers, and therefore is found to be of little value as a guide to progressive reinnervation. It takes considerable experience to evaluate the R.D. findings under these circumstances.

The strength-duration curve measured over its entire range eliminates these difficulties. The method for obtaining the strength-duration curve, very briefly, consists of: 1) find the rheobase, with a long duration pulse; 2) progressively shorten the duration and record the intensity required for a minimal contraction at each duration; 3) for normally innervated muscles, the intensity remains the same over a wide range, increasing only when very short impulses are used; 4) when muscle alone is being stimulated (denervated muscle) the curve starts to rise already at fairly long stimulus durations, with no response elicited at shorter pulse durations; 5) during recovery, or other forms of partial innervation, the curve is broken, showing elements of both excitable tissues (nerve and muscle) and "discontinuities" or "kinks" appear.[19]

It is clear of course that all the data obtained in the R.D. test and the chronaxy test, with one exception, are contained in the strength-duration test. The latter covers the entire range of stimulus durations, of which both chronaxy and R.D. tests are special cases. The one exception is the slow rolling contraction of the R.D. test which, while it can be observed in the other tests, does not usually become part of the record. This is actually an important omission because it expresses a change in the contractile process which should (but not always does) parallel the change in excitability. The contraction form for long stimuli should always be noted on the strength-duration curve record. It has already been pointed out that taking a strength-duration curve is time consuming and should be done under exact experimental conditions if reliable results are to be obtained.

The proponents of the strength-duration curve feel that it presents the full facts concerning the excitation characteristics of the tissue being stimulated. It indicates:

1. Normal, denervated, and partially denervated muscle.
2. It indicates the portion of each—the ratio of innervated to denervated fibers.
3. The changes in serial curves are of most value if recorded from month to month.

However, as has been pointed out before, even this test utilizes only the first two factors of excitation—Intensity and Duration—it does not utilize the third factor—Speed of Rise—which we will discuss next.

THE THIRD FACTOR OF EXCITATION—SPEED OF RISE

The third factor which determines the effec-

tiveness of a current as an electrical stimulus is the speed with which the current reaches its maximum intensity. If we start again with a current of rheobasic strength and a duration longer than the utilization time we can reduce the effectiveness of this current by allowing it to reach its maximum value slowly instead of abruptly. Here again, a similar relationship exists between the speed of rise and the intensity as existed in the second factor of excitation. In other words, one can restore the effectiveness of the current with a slowed down speed of rise by increasing the intensity. If one slows the current down more there is again loss of effectiveness which again can be restored by increase in intensity. In this way a curve develops which expresses the relationship between the intensity of the current necessary for stimulation and its speed of rise. This curve has been determined by A. V. Hill and is called by him the accommodation curve.[12] This curve again is characterized by a time constant in the same way as the chronaxy is the time constant of the strength-duration curve. This time constant is called the factor lambda or the factor of accommodation. While the mathematics of this analysis is not anywhere near as simple as Lapicque's approximate formula, nevertheless A. V. Hill has shown that the complete mathematical analysis of the third factor of excitation is very similar to that of the second factor. It should be emphasized that the second and third factors of excitation are independent of one another. While Lapicque has maintained for many years that the two were related it has now become abundantly clear that such is not the case. It is possible to change the chronaxy or the factor K in an excitable tissue without changing lambda and it is also possible to change the factor lambda without changing the factor K.

A. V. Hill has given the mathematical treatment of excitation which takes into account these two time factors K and lambda [8, 9]. He suggests that when excitation starts, a local excitatory process might build up according to an exponential curve. Its curvature is determined by the factor K. Secondarily to this the threshold starts to rise according to another exponential curve with a much longer time constant lambda. When the K curve and the lambda curve meet, excitation occurs. Because of the much slower rise of the lambda curve this will continue to rise, and eventually rise again above the excitatory process, and excitation will stop. This explains why excitation at the make of the current occurs only at the cathode and gives a theoretical explanation for this well established physiological fact mentioned above. A. V. Hill could also show that at the anode the processes are reversed and that excitation there can occur only at the opening of the current. Some very interesting conclusions can be drawn from this. For instance, if the rise of threshold determined by the factor lambda could be eliminated excitation once started would continue to occur. In other words, a single stimulus of adequate duration would under those circumstances produce a tetanic response instead of a single twitch at the beginning of the passage of the current.

Experimentally it is possible to eliminate the rise of threshold by withdrawing the calcium ions from the surrounding fluid. Under those circumstances a tetanic response occurs. Clinically the same thing occurs in patients with parathyroid disease and generally with low ionic calcium blood levels. In muscle degeneration a similar change in lambda takes place. Pollock and his co-workers have done considerable clinical work on the so-called "twitch-tetanus ratio" which is the ratio between the threshold for tetanic response and a single twitch response.[16] In a normal muscle this is approximately three, in a denervated muscle it goes down to a minimum value of one. It was at that time felt that this might be a valuable clinical method of determining excitation. It was not clearly realized, however, that what was really measured is the factor lambda, the third factor of excitation. While this is undoubtedly one factor determining the characteristics of excitation, it is by no means a complete analysis of the excitatory process because it does not determine the other factor of excitation K (or chronaxy).

A. V. Hill and his co-workers could actually calculate from the mathematics of the excitation process exactly how long a tetanic response would be maintained dependent on different values of K and lambda and found that these theoretical calculations could be experimentally verified. Also as we will see when we discuss alternating current stimulation, it is possible to calculate the response of a nerve or muscle to alternating current once the rheobase and the factors K and lambda are known.[10] In A. V. Hill's laboratory such calculations were based on independent determinations of K and lambda. They could then be verified by actually determining a frequency-intensity curve of the same nerve muscle preparation (see below). It was found that the experimental data fitted well into the theoretically predicted curve.

While on first sight A. V. Hill's theory might

look somewhat complicated it actually is the simplest possible hypothesis. Exponential processes are basic in biology and A. V. Hill's assumption really is that the processes of excitation can be explained by a double exponential process. It is truly amazing to see how many of the actual experimental findings can be predicted on the basis of such a simple mathematical assumption.

Clinically the third factor of excitation can best be evaluated in two ways, by the measurement of the twitch-tetanus ratio and by the measurement of the threshold at different speeds of rise. The twitch-tetanus ratio is determined with a galvanic current applied at the motor point. The intensity is raised until a minimal twitch response is obtained and the current strength noted. The intensity is then raised until the contraction is maintained for a certain length of time (usually 1 to 2 seconds). This can be seen most easily by the fact that relaxation occurs on opening of the current. The current intensity is again noted, and the ratio between these two is the twitch-tetanus ratio. For the determination of the threshold at different speeds of rise the use of alternating current stimulation at very low frequencies is most convenient. This method will be discussed below.

Alternating Current Stimulation

It is well known from animal experimentation that a muscle such as the frog gastrocnemius has an optimum frequency with which the threshold is lowest. Both above and below this optimum frequency, the threshold increases.[10, 12] If the threshold for electrical stimulation at different frequencies is plotted as a function of frequency a curve results which is called the frequency-intensity curve. If the frequency scale is logarithmic the curve is symmetrical about the ordinate through the optimum frequency (Fig. 4 left). As has been mentioned before, this curve follows mathematically from A. V. Hill's equations and the experimental data fit into this curve over a wide frequency range. In the case of the frog nerve and muscle, the optimum frequency is approximately 180 cycles/second. Without going into the details of the mathematical analysis of this curve it is interesting to compare the rise of the threshold above the optimum frequency and below it.

If one compares a stimulus with a frequency of 200 cycles and a stimulus of for instance 1000 cycles at the same intensity, one can analyze the difference between the stimulating half waves of the two frequencies in order to find the reason why the threshold goes up. The duration of the half cycle at 1000 cycles is five times shorter than that at 200 cycles and one can therefore conclude that the duration of the stimulus (that is the second factor of excitation) varies significantly above the optimum frequency. On the other hand, the current rises faster in a half cycle which lasts only 1/2000 of a second than in a half cycle which lasts 1/400 of a second. In other words, if the speed of rise of a 200 cycle stimulating current was adequate, certainly the speed of a rise of a 1000 cycle alternating current is even more adequate. Therefore, the conclusion can be drawn that above the optimum frequency, the threshold rises because with increase of frequency the duration of the stimulus becomes progressively shorter. The part of the curve then which is above the optimum frequency rises and expresses in this rise the second factor of excitation, namely, chronaxy or K.

Below the optimum frequency the situation is however entirely different. If one compares again a stimulus of a frequency of 200 cycles with a stimulus of a frequency of for instance 50 cycles the duration of the half cycle of the 50 cycle stimulus is longer than that of the 200 cycle stimulus, in fact four times as long. Therefore, if the duration of the 200 cycle stimulus was adequate for stimulation certainly the duration of the 50 cycle stimulus is more than adequate for stimulation. In these low frequencies, however, the difference is in the speed of rise, because the half cycle of the 50 cycle current rises four times as slowly to its maximum value as that of the 200 cycle current. Again one can come then to the conclusion that below the optimum frequency the threshold rises because of inadequate speed of rise of the stimulating current. And therefore the curvature of the threshold curve below the optimum frequency is determined by the third factor of excitation, the factor lambda or accommodation. In summary then, the complete frequency-intensity curve expresses all three factors of excitation. Above the optimum frequency the rise is largely determined by the second factor of excitation (K or chronaxy) and below the optimum frequency the rise in the curve is determined largely by the third factor of excitation (accommodation or lambda).

A. V. Hill has further shown mathematically that if one plots this curve on different coordinates, namely I^2 *versus* n^2 above the optimum frequency and I^2 *versus* $1/n^2$ below the optimum frequency, this same curve degenerates into two straight lines (Fig. 4 right). The slope of the line

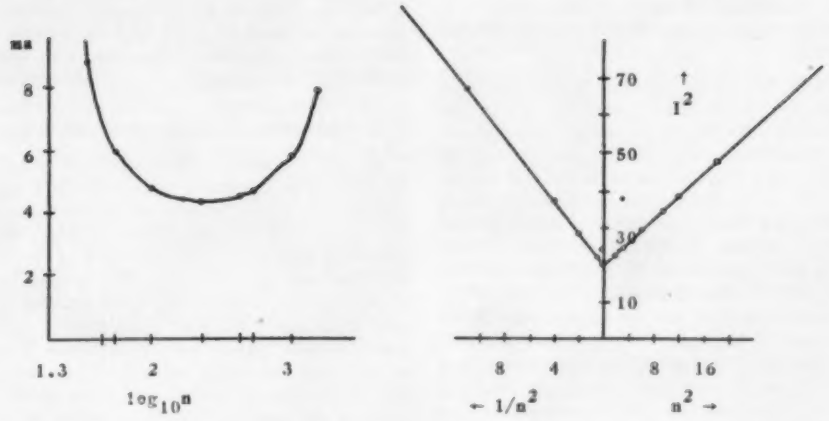

Figure 4. Frequency intensity curves of frog muscle. Left: plotted on logarithmic frequency coordinates. Right: plotted I^2 versus n^2 above the optimum frequency and I^2 versus $1/n^2$ below the optimum frequency.

of the frequencies above the optimum frequency is proportional to the square of the chronaxy or square of K. The slope of the line below the optimum frequency is proportional to the square of $1/\lambda$. The slopes of these lines then give very simple ways to determine the factors K and lambda, or at least indicate values which are expressive of the values of K and lambda. Because these curves are straight lines, two points will determine the entire curve and a determination becomes again a very simple one.

In application to human muscles, curves are obtained which are entirely different from those obtained in an animal. There is a broad minimum from approximately 10 cycles per second to almost 1000 cycles. It can be shown that this is very largely due to skin impedance and tissue short circuits. Interestingly, however, above 1000 cycles the curves are very similar to those plotted by A. V. Hill for animal muscles. Determination of skin impedance over a similar frequency range gives an explanation of this phenomenon and shows that above 1000 cycles the impedance factors become sufficiently constant so that the values obtained for stimulation thresholds are indicative of actual muscle thresholds. It is found that below 1000 cycles per second, skin impedance and tissue short circuits seriously interfere with the quantitative measure of excitation and that above 1000 cycles these factors are no longer disturbing because their values become constant enough so that they do not interfere with the quantitative measurements. As will be mentioned below, measurements above 1000 cycles up to 20,000 cycles give a simple and accurate way to measure the second factor of excitation. It is possible to develop from this a simple relation, the "K ratio" which is the ratio of the threshold at 20,000 cycles and at 2,000 cycles. This ratio increases from those in normal muscle to much higher values in denervated muscle and generally can be expected to increase whenever the second factor of excitation (K or chronaxy) increases. These findings give additional emphasis to the fact mentioned above that tissue short circuits change with the duration of the stimulus. Only when the stimuli become very short (less than 1/1000th of a second) do these disturbing factors become less important. In classical chronaxy determinations, one compares the effect of long lasting stimuli (the rheobasic stimulus of 300 msec.) with very short stimuli (the chronaxy stimulus at double the rheobase). One of these stimuli has more of the errors in it than the other. The comparison of the two which is necessary for the determination of chronaxy

which is quite accurate in animal muscle experiments is much less accurate in human experiments because of the skin impedance and tissue short circuits. Here is another reason why the clinical application of chronaxy has not proven as accurate as can be expected from physiological experiments.

Drawing the human curves as straight lines according to A. V. Hill's analysis shows that below 1000 cycles the curves behave quite abnormally. Sometimes a straight line may actually go down instead of up as found in animal experiments. At very low frequencies, however, below 10 per second the curve starts to rise again because in this case all stimuli are of such long duration that again tissue short circuits and skin impedance do not seem to change enough to disturb the accuracy of the measurements. Below 10 per second this method can again be used for an attempt at quantitative measurements of muscle excitation, this time measuring the third factor of excitation (the factor lambda). It is again possible to give a simple index of the factor lambda by comparing the thresholds for two frequencies. We have chosen 10 cycles per minute and 10 cycles per second. The ratio between those two thresholds is an indication of the factor lambda and is called the "lambda ratio." The value of this as found in normal muscle can go down in denervated muscle or in the patient after parathyroidectomy to as low as 1. While it is therefore physiologically accurate to say that in the animal muscle the entire frequency-intensity curve measures all three factors of excitation, in the human experiment only the two extremes towards the very high frequencies and towards the very low frequencies can be used. These two extremes give the possibility, however, of measuring both the factor K and the factor lambda without the errors inherent in other methods of electrodiagnosis which use a comparison between frequencies within the abnormal area and outside of it.

CLINICAL APPLICATION OF ALTERNATING CURRENT STIMULATION

A.C. stimulation of innervated muscle

It has been suggested that frequencies between 10 cycles/second and 100 cycles/second be used in the electrical stimulation of innervated muscle.[14] However, if one compares the threshold for motor stimulation and for pain it is found that with increasing frequency the pain threshold rises much more than the motor threshold. The difference becomes very marked above 1000 cycles/second.

From this study the conclusions were reached, that frequencies above 1000 cycles/second are generally found to give the best response with the least amount of pain, and that these would seem to be the logical frequencies to use clinically in the electrical stimulation of innervated muscle.

A.C. stimulation of denervated muscle

In the electrical stimulation of denervated muscles, it is important to: 1) obtain a vigorous contraction of the muscle or maximum tension; 2) simulate a voluntary contraction; and, 3) stimulate within the pain tolerance of the patient. By using an A.C., it is possible to find the frequency which requires the least amount of current to obtain a minimal contraction. In denervated muscle this is usually between 2 cycles/minute and 40 cycles/second. Then using this frequency, the intensity is increased to the tolerance of the patient, usually resulting in a good contraction of the muscle. If the best stimulating frequency is found to be above 2 cycles/second the current should be modulated to between 20 and 30 contractions/minute. Below this frequency the current frequency will control the number of contractions. This produces contractions comparable to voluntary muscle contractions.

Unipolar or bipolar stimulation may be used. In many cases group stimulation can be used effectively in A.C. stimulation. It is possible to be quite selective in the muscles to be stimulated, by careful selection of the stimulating frequency. With reinnervation, the best stimulating frequency will gradually increase. It is important, therefore, to check the frequency at certain intervals, in order to maintain the most efficient current for stimulation.

Use of alternating current for diagnostic purposes

We have shown that the curve of cutaneous stimulation with high frequencies (above 1000 cycles per second) is similar to that of denuded animal muscle. Therefore, if we assume that the curve of denuded animal muscle is the true frequency-intensity curve, it would appear that in cutaneous stimulation the curve on the high frequency side would represent a most accurate picture of muscle excitation. A study was made to see if the high frequency part of the curve could be used in the quantitative measurement of muscle excitability. Curves were made on five patients—plotting I^2 against n^2 according to

A. V. Hill as previously described. The curves included 5 normal muscles and 14 different abnormal muscles in various phases of denervation. Manual muscle tests had been completed before the electrical testing. From these data it was found that there is a good correlation between the slope of the straight line and the amount of denervation. It appears that the slope of this line would be an indication of the value of K of excitation. This study has been an attempt at a clinical application of the high frequencies in a quantitative measurement of the excitation of muscle. As high frequencies are used, the distortion which results from the passage of current through the skin and tissue short circuits is eliminated. An accurate measurement of muscle excitability results. A simple factor of excitability (the K ratio) can be determined for these data. The results of this study will be reported elsewhere.

We have also tried to develop a clinical test of accommodation by finding the ratio between the threshold of a current with a fast speed of rise and the threshold of a current with a slow or more gradual speed of rise. As mentioned above the low frequency side of the frequency-intensity curve can be used to study accommodation. In the low frequencies the current rises slowly and as the current becomes more slow, the threshold rises, and the stimulus must be increased in order to be effective. Therefore, the test includes the following steps: 1) find the motor point of the muscle to be tested (using direct current); 2) switch to A.C. with a frequency of 10 cycles/second (for the current with the fast speed of rise), modulated at between 20 and 30 contractions/minute; 3) find the threshold at this frequency; 4) switch to the frequency of 10 cycles/minute for the current with a slow speed of rise; 5) find this threshold; 6) divide the threshold at 10/minute by the threshold at 10/second. This is called the lambda ratio.

Present data indicate that in the normal muscle (because muscle accommodates to the slowly rising current) much more current is required at 10/minute that at 10/second, and that the ratio between these values is quite constant. In denervated muscle, accommodation gradually disappears and, therefore, the ratio becomes less and will go down to a minimum of 1.

Table 1 gives a summary of the different diagnostic tests and methods and shows which of the three factors of excitation is important in each of them. We see particularly that A.C. stimulation is based on all three factors, 1) threshold, 2) duration which becomes important at high frequencies (with shorter durations, a greater intensity is required), and 3) speed of rise which becomes important at low frequencies (with a slower speed of rise, a greater intensity is required).

TABLE 1

Test	Threshold	Duration	Speed of Rise
R. D. (Erb)	+	+	
Chronaxy	+	+	
Twitch Tetanus Ratio	+		+
Strength-Duration Curve	+	+	
Progressive Current	+		+
Alternating Current	+	+	+
above 1000 cycles/sec.	+	+	
below 10 cycles/sec.	+		+

Some Remarks on the Problem of Skin Impedance and Tissue Short Circuits

It has been stated repeatedly that the erratically varying impedance of the skin and of the short circuiting tissues is the major factor responsible for the difficulties in clinical application of electrodiagnosis in man. Without going into the details of skin impedance measurements, some general conclusions can be drawn. If one applies to the human skin a square wave of a frequency of a few 100 cycles and shows on a cathode ray oscilloscope the current which passes through the subject, this current is very far removed from a square wave. Only at much higher frequencies does the current again become at least similar to a square wave. If one replaces the square wave by a sinusoidal current the distortion visible on the oscilloscope is much less. In view of the impedance system of the skin and tissue short circuits, this is what is to be expected on theoretical grounds and can easily be demonstrated. The distortion of the current which becomes visible contains a large amount of what the engineer calls phase distortion. If the engineer wants to test electronic equipment for the presence or absence of phase distortion he will use square waves for testing rather than sine waves because the effect is so much more easily demonstrated. Conversely it would mean that if one wants to avoid the effects of phase distortion as much as possible one would not want to use square waves for stimulation but would rather use sinusoidal currents in which the phase distortion is not so disturbing.

We do not mean to imply that in the use of sinusoidal currents, phase distortion does not

occur. In fact, one can easily demonstrate on the scope that a phase shift occurs in passage through skin and tissues. However, this phase shift does not interfere with the wave form of the curve and, therefore, does not interfere with the stimulating properties of the sinusoidal current. Also as a result of the impedance properties of the skin, there will be a marked difference between the amount of sinusoidal current which passes through the skin at different frequencies if the voltage presented to the patient is the same. This, however, can easily be measured on a milliammeter in series with the subject, and can be compensated for by appropriate change of the intensity control. The point that we are making is not that phase distortion does not occur in the use of sinusoidal currents, but that in the sinusoidal current this can be compensated for very easily by measuring instruments and that the phase distortion does not interfere with the physiological properties of the sinusoidal current. On the other hand in the use of square waves, such distortion of the wave forms occurs that the actual stimulating current has very little relation to the square wave which was originally presented to the patient.

As one of the advantages of square wave stimulation it has been mentioned that the duration of the stimulating current is exactly known, while in the sinusoidal current one can argue about which part of the half cycle really stimulates. This argument is no longer of much importance on the basis of A. V. Hill's mathematical analyses [10, 12] because it is possible to substitute the basic equation for alternating current into the basic stimulation equations and come up with a frequency-intensity curve which fits the experimental data. In actual fact, the mathematics of an alternating current is simpler than the mathematics of square wave stimulation. The argument, therefore, that the effect of the sinusoidal current cannot be analyzed as easily as that of the square wave current simply has no basis.

It is electronically possible to design circuits so that regardless of the form of the total impedance of the patient the current remains a square wave. This can be done by the use of constant current and feedback circuits. Such machines are at present on the market. If in such a machine one puts a small resistance in series with the patient and shows the current going through this resistor on a cathode ray scope, one obtains indeed a square wave. It looks then as though such equipment would solve the problem of the distortion of the current by skin and tissue impedance. However, this is only apparently so and not true in reality. The reason for this is the varying impedance of the tissue short circuits. What these electronic circuits keep constant is the total current passing through the patient. But this current is divided between the current passing through the muscle under examination, which is the important one, and the leakage current passing through surrounding tissues. We have previously indicated that by far the largest portion of the stimulating current passes through the tissue short circuits rather than through the muscle being stimulated. If all these impedances would change in the same way, the problem might be solved. It can be shown, however, that they do not, and therefore the division of the current between the muscle to be stimulated and the tissue short circuits becomes entirely different from moment to moment. In actual fact while the total current passing through the subject remains a square wave the current passing through individual parts does not. One can easily show this in a simple demonstration. If one uses such a machine and puts a resistance in parallel to the patient, the total current remains a square wave; however, if one now measures the current passing through the subject only, it is no longer a square wave. In fact, if one also measures the current passing through the parallel resistance only, this current is no longer a square wave either. This is necessary in order to make the total current remain a square wave. While this is demonstrable with the linear parallel resistance, it becomes more exaggerated when one is dealing with short circuits which are tissues and which in themselves have variable resistances depending on duration of the stimulus and direction of current passage.

The general conclusion, therefore, is that while it is possible electronically to keep the total current passing through the subject in the form of a square wave, this does not mean that the current passing through the muscle under examination is still a square wave. In fact, there is evidence to show that this is definitely not true. In the use of sinusoidal wave, these phase distortions also occur but as pointed out before, the current remains a sinusoidal current. Therefore, the distortion of the current which actually stimulates the muscle is considerably less than in the case of square waves. It is for this reason that sinusoidal currents have advantages over square waves in quantitative electrodiagnostic processes. The sinusoidal current lends itself as well or better to a clear (mathematical) understanding of the excitatory process than the square wave current.

ELECTROMYOGRAPHY

While electromyography is outside of the scope of this paper, a few words should be said about the relation of electrodiagnostic technics as mentioned in this paper to electromyography. It has sometimes been stated that one supersedes the other or that the two are in a somewhat competitive position. Nothing could be farther from the truth. Classic electrodiagnosis with stimulating technics measures the excitability of the muscle, and measures the excitability of the muscle as a whole. Electromyography can distinguish between innervated muscle fibers and denervated muscle fibers on the basis of fibrillation potentials versus motor unit potentials. By the use of very small electrodes, electromyography can analyze a part of the muscle, while in classic electrodiagnostic technics the entire muscle is examined because its visible contraction is the indication of threshold response. Electromyography is somewhat more difficult to use for quantitative evaluation than electrodiagnostic technics. The effects of current leakage can be extremely severe and a quantitative evaluation of muscle strength by electromyography in those studies with carefully controlled experiments has not proven as successful as originally hoped. On the other hand because of the fact that the electromyographic examination can be of considerable value in evaluating the parts of a muscle this can become a valuable method in those muscles where normal and denervated fibers are found side by side. Electromyography can also be of considerable value in that it can evaluate the actual performance of the muscle on a qualitative basis in the performance of voluntary motor functions. It has been used extensively and with great success in studies of muscle coordination. It would be fair to say that electromyography and classical electrodiagnosis far from being exclusive to one another complement one another in the complete evaluation of muscle status by electrical methods.

REFERENCES

1. Bouman, H.D.: Arch. Neerl. Physiol., 14: 199-233, 1929
2. ——— and G. van Rynberk: Arch. Neerl. Physiol., 23: 34-55, 1938
3. Bouman, H. D.: Arch. Neerl. Physiol., 12:403-415, 1928
4. Bourguignon, Georges: La Chronaxie chez l'Homme, Paris, Mason, 1923
5. Erdman, William J.: Am. J. Phys. Med. 33:167-172, 1954
6. ———: Arch. Phys. Med. & Rehab., 35:638-642, 1954
7. Fulton, J. F.: Textbook of Physiology, Ed. 17, Chapter 2, Philadelphia, Saunders, 1955
8. Hill, A. V.: Proc. Roy. Soc., Series B., 119:305-355, 1936
9. ———: Proc. Roy. Soc., Series B., 119:440-453, 1936
10. ———, B. Katz, and D. Y. Solandt: Proc. Roy. Soc. Series B., 121:74-133, 1936
11. Iddings, Dorothy M., Ruth C. Morrissey, Arthur A. Rodriquez, and H. Worley Kendall: Phys. Therapy Rev., 31:5-10, 1951
12. Katz, Bernhard: Electric Excitation of Nerve, London, Oxford Univ. Press, 1939
13. Lapicque, Louis: L'excitabilite en Fonction du Temps, Paris, Herman, 1926
14. Osborne, S. L., A. J. Kosman, H. D. Bouman, R. T. McElvenny, and A. C. Ivy: Surg. Gynec. Obst., 88: 243-253, 1949
15. Pollock, L. J., J. G. Golseth, and A. J. Arieff: Surg. Gyn. Obstet., 79:133-141, 1944
16. ———: J. G. Golseth, and A. J. Arieff: Surg. Gynec. Obst., 81: 660-666, 1945
17. Stetson, R. H. and H. D. Bouman: Arch. Neerl. Physiol. 20:177-254, 1935
18. Wynn-Parry, C. B.: Proc. Internat. Congress Phys. Med., London: 298-306, 1952
19. ———: Brain, 76:229-265, 1953

This paper was accompanied by a series of demonstrations in which the currents used were shown on cathode ray oscilloscopes together with the resulting contractions. The authors wish to gratefully acknowledge the help received from the following companies who made equipment available without charge for this demonstration. The Technical Products Division of Allen B. Dumont Laboratories of Clifton, N. J. (oscilloscopes); the Hewlett-Packard Company of Palo Alto, California and their New York Representatives, RMC Associates (oscillators and meters); the Institute for Crippled and Disabled of New York (stimulator); McIntosh Laboratory of Binghamton, N. Y. (power amplifier); and the Teca Corporation of White Plains, N. Y. and their representative the Fred Landauer Corporation of Rockeville Centre, L. I., N. Y. (chronaximeter). Industrial television cameras were used to make the demonstration visible on monitors throughout the room. This was engineered by I.T.V. company of New York City. The expenses for the industrial television equipment, made available to us at minimal cost, and other expenses of the demonstration were met by grants from the University of Wisconsin Medical School and the *American Journal of Physical Medicine*.

Therapeutic Indications for Pool Therapy

C. L. Lowman, M.D.

Since there is still some lack of understanding on the part of the medical profession as to the usefulness of pool therapy, a restatement regarding its use may be timely.

At the Orthopaedic Hospital in Los Angeles, therapeutic pools have been in use since 1924, and have been found useful in treating a wide range of conditions for patients of all ages.

The values obtained are definitely related to the therapist's degree of skill and to the physician's knowledge of indications for prescribing. The better the understanding between the physician and therapist the better will be the result for the patient.

Although the doctor may not have technical knowledge of hydraulics or the dynamics of motor performance in water, he can obtain desirable treatment results if his prescriptions to the department indicate the patient's condition, the physiological response desired, and give cautionary notes as to frequency and duration of treatment. Inquiry as to kinds of treatment available will in a short time give the doctor an increased knowledge of how to prescribe.

Due to the great frequency of poliomyelitis throughout the last two decades, many younger doctors think of pool treatment only in connection with paralyses and neuromuscular disorders, and have little apprecation of other pool values. Because of lack of training in dynamic anatomy, they have not been exposed to pool treatment for other conditions. In fact, the use of pool therapy has slackened in many institutions. Spokesmen at some centers have even said that pool therapy is old-fashioned or outmoded.

It may be that the very interest and support of therapeutic pools by the National Foundation for Infantile Paralysis has engendered a feeling among some physicians and surgeons that polio is the sole condition in which pool work is of value.

During the Sister Kenny regime there was a certain downgrading in the use of pools. She expressed her disbelief in them quite forcefully; therefore, the therapists who came under the influence of her teaching did not gain much knowledge of kinesiology as applied to water. Now, with a dearth of physical therapists and an increased number of doctors who are uninterested in, or unable to prescribe pool therapy, appreciation of this excellent means of treatment has decreased.

Our experience with therapeutic pools at the Orthopaedic Hospital extends over 32 years, during which time an average of 2,000 treatments a year have been given for a wide variety of cases. During the years 1940 through 1955 a total of 2,302 pool treatments were given to polio patients, whereas during 1953 alone, 3,042 pool treatments were given for varied conditions.

Neuromuscular cases are treated most frequently, with postsurgical—plastic surgery to muscles, tendons and joints; post-traumatic—primarily of backs and knees; arthritides and postural deviations following in the order given. Pool treatments are of major value for postsurgical leg and hip procedures, such as shelf operations for congenital hips, cup arthroplasties, prosthetic hips, osteotomies, and fractures of femur repaired by various methods of pinning or grafting.

Many of these patients may start treatment early, because movement is possible without the stress of gravity on the affected area. The buoyancy of the water supports the part so that the muscles act more freely and have only the viscosity or buoyancy of the water to overcome.

When the pool is used for the first movements of a painful, operated area, an increased arc of motion is obtained before inhibitory spasm begins. Avoidance of the pain-spasm-pain cycle, due to the relaxing effect of the warm water and the assistive action of buoyancy, allows the beginning of a controlled pattern of movement which each treatment increases in range and control. Bone density is stimulated by weight bearing and muscle tension. Calcification is encouraged and atrophy from inflammation and disuse is improved.

Pools that have a deep section (about 4 feet 6 inches to 5 feet) permit exercises for standing

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and walking in deep water, both valuable for gradually increasing weight bearing, as the only weight borne is that which is above the surface of the water. In this way, a pattern of walking may be reestablished without endangering the operated area. Then in shallower depths, the weight bearing is gradually increased, according to X-ray and clinical findings.

The use of single or double parallel bars has been illustrated in the manual, *Therapeutic Use of Pools and Tanks.** Aside from the kinetic and dynamic aspects of pool work there is also a hydropathic element, i.e., the heat of the water relaxes hypertense or painful muscles and alters circulation by increasing vasodilation. Together with the compressive action of the water, this hastens the physiologic interchange of the metabolites and promotes oxygenation in the working muscles and all skeletal structures involved. As stated hydraulically, "Pressure increases with density and depth." Hence, muscular action in the legs against the compressive action of the water promotes all the processes of repair.

Post-traumatic cases are treated similarly to operative ones. Back strains, sciaticas, fasciitis, myalgias, too, are greatly benefited after, or in connection with, definitive treatment such as bed rest and traction. Many compensation cases can be mobilized more easily than by other means and their psychosomatic reactions are lessened. The psychological benefits are increased since the patient undertakes an activity program instead of having something done to him.

* Lowman, C. L. and Roen, Susan: *Therapeutic Use of Pools and Tanks*, William B. Saunders Co., pp. 12, 69, 70.

A major value of pools from a rehabilitational angle is the safety and speed of treatment earlier than otherwise possible, and the raising of morale for the patient who has undergone major surgery. Neurotic and hypertense patients benefit from the sedative effect of the heat as well as the improvement of vasomotor tone, and the dilation of the periphery brings blood away from the brain. A sense of relaxation is achieved and muscle and nerve tensions are reduced. As a first postoperative follow-up, a considerable range of muscle and joint motion is usually obtained without inhibitory spasm.

When a pain-spasm-pain cycle is once initiated with the incidental psychic reaction to pain, followed by greater fear of more pain, and further inhibition to motion, valuable time may be lost in reestablishing function.

The gradations of weight bearing and function obtained by decreasing the depth from 4½ or 5 feet to the shallower one of 2½ feet is of great value, as is progression to standing and walking out of water with necessary mechanical aids, such as braces or corsets.

Another important element in evaluating progress of the patient is to test various movements in the water for comparison with muscle checks or functional tests out of the water. This will often help the surgeon to outline a total program for the patient.

In conclusion: We feel that pool therapy, as a physical therapy modality, rates among the most valuable in meeting the physiological needs and improving the function of the rehabilitation patient.

National Society for Crippled Children and Adults
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Pulley Exercise Frame

Herbert Z. Kravis, B.S., and Lucille H. Burl, B.S.

In the field of therapeutic exercise there are many effective devices to aid the physical therapist and the patient in the activities of their exercise program. In our department a need for several devices for different exercise technics had presented itself. We have alleviated the problem by the construction of a simple device that has incorporated several of the wanted therapeutic technics. The apparatus is called the "Pulley Exercise Frame."

The exercise frame (Fig. 1) has been fabricated by the attachment of tubular bars to a treatment table. Two vertical bars are braced along the legs at one end of a treatment table and further braced by diagonal supporting bars.

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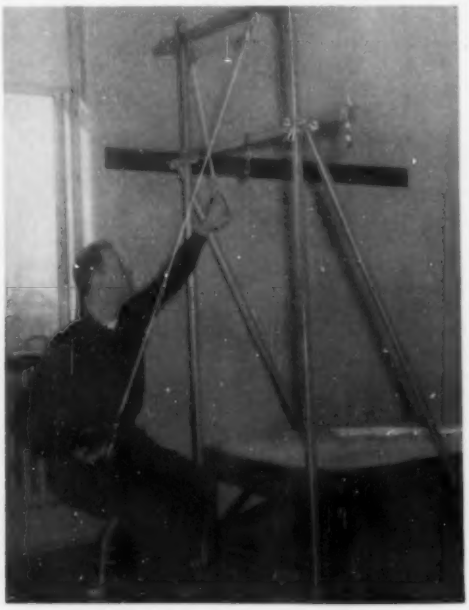

Figure 1. Exercise Frame showing reciprocal motion of shoulder abduction.

A single wood bar is fastened horizontally to the same two legs of the table at a height of 2 inches from the floor. Additional movable bars are clamped horizontally along the two vertical ones at different heights. The fastening of any of the tubular bars with another is accomplished by figure 8 swivel clamps which can easily be adjusted to alter the position of the bars. To this frame pulleys are attached which can be easily changed from one location to another. The best location of the pulleys can be obtained by fastening them in any position along the length of the bars, or by raising or lowering the bars to the height at which the pulleys will be of greatest advantage. The location of the pulleys and the horizontal bars depends on the particular exercise and the position of the patient—whether prone, supine, sitting, or standing. One or more pulleys in a sequence may be used to provide the desired exercise. When resistive exercises are being done the motion of the weights should be at the end of the horizontal bar away from the patient and the table.

Much of the accessory equipment can be purchased or easily made. Accessories (Fig. 2) needed for most exercises include clamp-anchored swivel pulleys, figure 8 swivel clamps, assorted rope lengths with snaps fastened at each end, weight pan, assorted weights, sandbag, hand stirrups, ankle straps, wrist and ankle cuffs. It is necessary to have a ring attachment on each of the cuffs, straps and stirrups, to furnish a connection for the rope. Use of the sandbag provides an excellent cushion and deadens the sound of the weights as they lower to the floor. Additional accessories not shown in figure 2 such as head harness, chest harness, and Sayre sling can be used for exercises of the neck and trunk and for cervical traction.

The frame and accessories are designed for use in three major types of exercise: 1) resistive or assistive exercises, 2) reciprocal motion, and 3) constant traction. In repetitive motions weights are used to provide a constant resistance or assistance throughout the range of motion of the exercise. For traction, the force is variable to the amount of weights used. Reciprocal motion is available by the use of one or more pul-

Figure 2. Accessories.

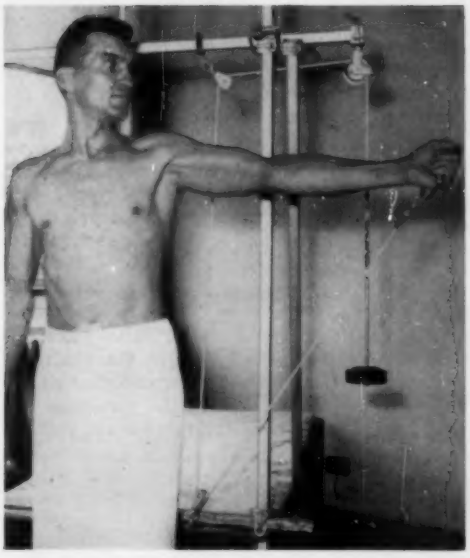

Figure 3. Resistive shoulder abduction.

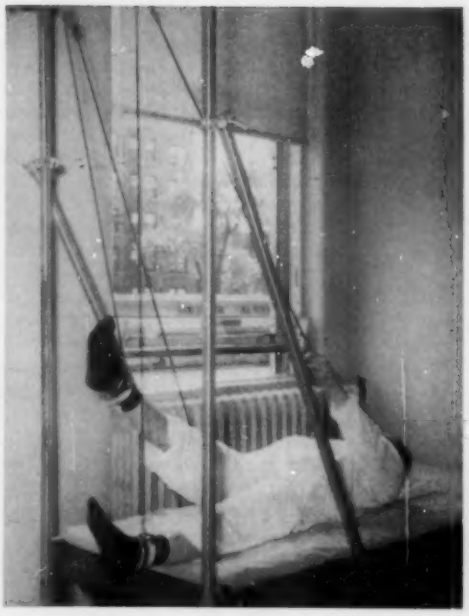

Figure 4. Reciprocal motion bilateral assistive hip flexion and/or resistive hip extension.

Figure 5. Resistive hip adduction.

Figure 6. Constant traction to knee.

leys through which the rope has passed and is attached to either the upper or lower extremities.

By changing the position of the patient or the pulleys or both, resistive and assistive exercises can be accomplished by all joint motions of the neck, shoulder, elbow, forearm, wrist, hip, and knee. Reciprocal motion can be done simultaneously or alternately in bilateral or unilateral motions of the shoulder, elbow, hip, and knee. For muscle contractures or joint stiffness, traction when indicated can be given to the knee, hip, elbow, shoulder, and neck. Figures 1 and 3-6 show examples of some of the various exercises available.

Materials necessary to construction included a treatment table, 72 inches long, 32 inches wide and 20 inches high. The clamps and tubular bars were secured from spare parts of Balken frames donated by the Orthopedic Service. The Maintenance Department fashioned the clamp-type swivel eye pulleys, reinforced the table, and attached the bars. Of the accessory equipment the Department of Surgery donated assorted weights, weight pan, Balken pulleys, and figure 8 clamps. The hospital seamstress tailored the ankle and wrist cuffs and the sandbag.

With the assistance of these departments we were able to construct the exercise apparatus economically. Three pulleys (swivel-type), eight snaps (swivel-type), two metal hand grips, two leather foot stirrups and safety rope cost $11.16.

SUMMARY

The construction of the "Pulley Exercise Frame" was made economical by using a treatment table, Balken frame tubing and other simple accessories. Effective use of the apparatus has made possible technics for therapeutic exercise programs.

Case Report

Report of a Case of Parkinsonism Treated with Proprioceptive Facilitation Technics

Margaret Knott, B.S.

A 58 year old male, a public accountant by occupation, was admitted to the California Rehabilitation Center for treatment, Feb 18, 1953. The history revealed that a diagnosis of Parkinsonism had been made when the symptoms first appeared one year prior to admission.

Upon admission the patient demonstrated a mild degree of tremor in the left upper extremity, and occasionally in the left lower extremity. Rigidity was present in all four extremities and also affected the facial muscles. The rigidity of the facial muscles produced the typical "masklike, staring" face, often evident in patients with Parkinson's disease. The patient walked with a slow, short step, carrying his left arm flexed and adducted. A self-care evaluation performed at admission revealed he had difficulty putting his left arm into his shirt and coat sleeves; he was not able to clip the nails of his right hand; shampooing his hair was an arduous task because of lack of power in the left hand in that position; and he fatigued easily. In the morning, stiffness made it difficult for him to put on his socks and shoes.

The patient was started on an intensive program of exercise for all extremities and facial muscles with emphasis on the left upper and left lower extremities. A technic of "rhythm" exercise incorporating maximal resistance was employed with patterns of neuromuscular facilitation for all motions. This "rhythm" technic is used to reinforce initiation of motion. The physical therapist moves the part to be exercised passively through the range of the pattern several times, thereby setting up a pace or rhythm for the patient to follow. After several passive motions the patient is asked to assist the physical therapist in the same pattern, still utilizing the rhythm set up with the passive motion. After several assistive-resistive motions, maximal resistance is given to the pattern. This so-called "pumping up," or rhythm, enables the patient to initiate the activity and to execute the motion with greater speed.

The rhythm technics were utilized in those self-care activities which the patient had difficulty performing. Following the "pumping up" motions of all the patterns of motion required for an activity, the patient was able to perform the motion successfully and with greater speed. After several days he was able to perform them at will.

In the gymnasium the patient was given a program of mat, pulley, and gait activities with emphasis placed on initiation of motion and speed of total performance in each. For example, on the mat the patient did the following: crawling, crab walk, rolling, walking on knees, and getting up and down from the mat as quickly as possible. When using the pulleys, he was given the maximum weight he could pull for each motion of the trunk and four extremities. Using the maximum weight, he was instructed to thoroughly complete each pattern of facilitation with as much speed as possible. He was also instructed to stop from time to time at different points in the range of motion of the pattern and initiate the activity again from that point. In all of these activities, the patient was instructed to work as rapidly and smoothly as possible.

For activities in the standing position, the patient was again taught rhythmical motions, such as hopping, skipping, jumping with feet apart and back together again, and touching his toes with his hands first to one side and then to the other. Actual gait training consisted of teaching him to walk with a definite rhythm, swinging his arms as he moved both forward and backward. He was given commands to stop quickly and then instructed to resume the same motion. Sudden commands to turn around quickly and walk in the opposite direction also were used.

On April 10, 1953, the patient was discharged. He was given a written program of activities similar to the regime carried out at the Center which he was to perform daily at home. At discharge, the patient had no difficulty with the self-care problems he presented initially. Rigidity was decreased and speed of performance of all motions was increased. His gait was faster and more rhythmical with the left arm swinging freely at his side. His "staring" appearance was improved to the extent of obvious comment from his friends and business associates.

If the same patient were under treatment at the present time (1957), he would probably receive cold applications daily before carrying out the activities described. These cold applications would consist of turkish towels wrung out from a pail of ice water kept at approximately 58° F. These would be placed entirely around the four extremities, neck, and on the back for a few minutes prior to carrying out the "pumping up" or rhythm technic. This would be done to promote relaxation and to reduce rigidity.

Chief Physical Therapist, California Rehabilitation Center, Vallejo, California.

Suggestions from the Field

Gadget for Resistive Finger Extension

Dorothy M. Dean, M.S.

Simplicity and effectiveness are two worthy features of any apparatus. This gadget, devised by a patient with a sutured (formerly divided) extensor tendon of the second finger, has both features. The need was objectively-graded and controlled resistive exercise for finger extension — that could be done throughout the day at home or at work.

The parts consist of an office rubber finger, a piece of wire, a fish hook (with barb filed off), and a series of dipsey swivel fish sinkers. For department use it would be necessary to have a number of different size rubber fingers.

This device can be carried in a pocket in a paper envelope and quickly assembled for use. The cost is negligible. The parts are easy to secure. It gives effective resistance for finger extension.

Co-Administrator Physical Therapy Center, Manitowoc, Wisconsin.

Figure 1. This illustration shows the gadget in use. The inset shows the separate parts.

Bracing for Severe Scoliosis of Muscular Dystrophy Patients

Charles Dorando, B.A., and
Max Karl Newman, M.D.

The Rodopri brace is a modified scoliosis brace adapted to meet the needs of muscular dystrophy patients with severe scoliosis and who are restricted to a wheel chair.

The conventional scoliosis brace, plastic jacket, and soft canvas garment with stays does not keep the patient in a supported position very long. The patient seems to flow into this type of bracing and the result is axillary pain and added discomfort. This happens because of the proximal type of involvement that is seen in many muscular dystrophy patients.

In these patients the shoulder muscles, the shoulder girdle muscles, and muscles about the hip are so weak and atonic that they give and roll like soft putty. Therefore, the body cannot be used to help stabilize the brace.

The Rodopri brace overcomes this by utilizing outside stabilization which is the arm rest of the wheel chair. The main support of the brace that is attached to the arm rest of the wheel chair has a leather strap attached to it. This encircles the patient and helps to pull him into a more corrected position. The stabilized support is shaped to fit the contour of the body on the side of concavity and is completely adjustable. The leather pad attached to a strap encircles the body and fits over the apex of the scoliosis on the side of convexity. This pad is then fastened to the stabilized arm rest and pulls the patient into a more functional position.

This type of brace seems to hold the patient in a more corrected position, does not interfere with function, and keeps the patient from falling out of the wheel chair. It also supports the patient so that he is able to use his slings to greater

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Figure 1. Patient in wheel chair with stabilizing bar attached to arm rest of wheel chair on the side of the scoliosis. Notice the adjustments so pad can be moved up or down.

Figure 2. Patient sitting in wheel chair with brace completely adjusted.

advantage and helps him to breathe more easily.

Most of the patients who have used this type of bracing like it and feel that it does the job for which it was intended.

This brace seems to meet most of the criteria for good bracing set forth by Dr. Robert Bennett.

Index to Current Literature

ADMINISTRATION

Principles of Supervision. Beatrice Whitcomb, Am. J. Occup. Therapy, 10: 288-292, November-December 1956

The AOTA Registration Examination. Hyman Brandt, Am. J. Occup. Therapy, 10: 281-287, November-December 1956

ARTHRITIS

Aging and Osteoarthritis. F. Bohatirchuk, Canad. M. A. J., 76: 106-113, Jan. 15, 1957

Growth in Still's Disease. B. M. Ansell and E. G. L. Bywaters, Ann. Rheumat. Dis., 15: 295-319, December 1956

Psoriasis and Arthritis. V. Wright, Ann. Rheumat. Dis., 15: 338-356, December 1956

Osteoarthritis—Its Prediction and Prevention. Esther Tuttle, New York State J. Med., 57: 91-96, January 1957

Rheumatism and Arthritis. (Review) Ann. Int. Med., 45: 1059-1210, December 1956

CEREBRAL PALSY

Factors Inhibiting Progress of Cerebral Palsied Children. Lester M. Brower, Am. J. Occup. Therapy, 10: 293-295, November-December 1956

The Use of Reserpine in Cerebral Palsy. Charles Watkins, South. M. J., 49: 1488-1494, December 1956

Recommended Standards for Hospital Out-Patient Services for Children with Cerebral Palsy by the Subcommittee on Medical Care of the Coordinating Council for Cerebral Palsy in New York City, Inc. L. Slobody, W. Cooper, G. G. Deaver, J. Greene, E. B. Schlesinger, W. B. Snow, J. Tobis and H. M. Wallace, Am. J. Phys. Med., 35: 353-359, December 1956

CIRCULATION

Collateral Circulation in Health and Disease. T. Winsor, J. H. Payne, N. Rudy and J. O. Beatty, Arch. Surg., 74: 20-28, January 1957

Lymphedema. G. E. Pratt and I. A. Buetow, Am. J. Nursing, 56: 1548-1552, December 1956

Reactions of the Blood Vessels of the Human Calf to Increases in Transmural Pressure. D. R. Coles, B. S. L. Kidd and G. C. Patterson, J. Physiol., 34: 665-674, December 1956

The Effect of Body Heating on the Circulation in Skin and Muscle. O. G. Edholm, R. H. Fox and R. K. Macpherson, J. Physiol., 134: 612-619, December 1956

The Importance of a Tight Blood Pressure Cuff. William F. Nuessle, Am. Heart J., 52: 905-907, December 1956

EDUCATION

Inservice Education at a Respirator Center. June E. Saunders, Am. J. Nursing, 57: 44-45, January 1957

Teaching the Concepts of Human Behavior. Theresa M. Fernandez, Am. J. Nursing, 56: 1567-1570, December 1956

GERIATRICS

Arthritis in the Aged. L. M. Lockie, J.A.M.A., 162: 1514-1517, Dec. 22, 1956

Attitudes Toward Retirement. Jacob Tuckman, Geriatrics, 11: 569-572, December 1956

Fractures in the Aged. C. R. Rowe and R. C. Detwiler, J.A.M.A., 162: 1517-1522, Dec. 22, 1956

Mental Reaction to Trauma and Hospitalization in the Aged. E. M. Litin, J.A.M.A., 162: 1522-1523, Dec. 22, 1956

Symposium: Physiologic Aspects of Aging. Geriatrics, 12: 18-59, January 1957

(continued on next page)

HAND

Dupuytren's Contracture. Tord Skoog, Postgrad. Med., 21: 91-99, January 1957

A Hand Corset. H. Herschel, Ann. Rheumat. Dis., 15: 346-347, December 1956

HEART

The "Staircase" Phenomenon and the Action of Calcium on the Heart. R. Niedergorke, J. Physiol., 134: 569-583, December 1956

HYDROTHERAPY

Pool Therapy: Problems and Planning. Elsa M. John, Physiotherapy, 42: 239-245, September 1956

MULTIPLE SCLEROSIS

Etiologic and Therapeutic Problems in Multiple Sclerosis. T. Lehoczky, Postgrad. Med., 21: 69-78, January 1957

The Familial Occurrence of Multiple Sclerosis. B. Estborn, Acta psychiat. et neurol. Scandinav., 31: 195, 1956

MUSCLE

Direct Stimulation Myography and Ergometry of Human Calf Muscles with Supplementary Observations on Calf Elasticity. E. E. Edwards and W. P. Murphy, Surg., Gynec. & Obst., 103: 719-725, December 1956

Effect of Stretch on Oxygen Consumption of Dog Skeletal Muscle in Situ. W. N. Stainsby, J. T. Fales and J. L. Lilienthal, Jr., Bull. Johns Hopkins Hosp., 99: 249-261, November 1956

Measurement of the Series Elastic Component at Various Times During a Single Muscle Twitch. D. R. Wilkie, J. Physiol., 134: 527-530, December 1956

The Dynamics of the Effect of Potassium on Frog's Muscle. A. Crapo and D. R. Wilkie, J. Physiol., 134: 497-514, December 1956

MYASTHENIA GRAVIS

Discussion on Myasthenia. J. Hamilton Paterson and others, Proc. Roy. Soc. Med., 49: 789-798, October 1956

Myasthenia Gravis. Walter Ganado, Geriatrics, 12: 66-68, January 1957

NEUROLOGY

Congenital Spinal Palsy. D. F. Ellison Nash, Brit. M. J., (No. 5005) 1333-1337, Dec. 8, 1956

Great Auricular Neurotomy for Tic Douloureux. J. Penman and L. S. Walsh, Brit. M. J., (No. 5009), Jan. 5, 1957

Lesions of the Cervical Spinal Roots as a Possible Source of Pain Simulating Sciatica. A. Torkildsen, Acta psychiat. et neurol. Scandinav., 31: 333, 1956

Lumbar Myelomeningocele. F. D. Ingraham and F. D. Fowler, S. Clin. North America, 36: 1569-1581, December 1956

Pathogenesis of Trigeminal Neuralgia. C. F. List and J. R. Williams, Arch. Neurol. & Psychiat., 77: 36-43, January 1957

Selective Partial Neurectomy in Hemifacial Spasm and Electrophysiologic Selection of Patients. W. A. Nosik and A. A. Weil, J. Neurosurg., 13: 596-602, November 1956

NEUROPHYSIOLOGY

A Further Analysis of the Neuromuscular Block Caused by Acetylcholine. S. Thesleff, Acta physiol. Scandinav., 37: 330-334, 1956

An Analysis of the Frequencies of Finger Tremor in Healthy Subjects. A. M. Halliday and J. W. T. Redfearn, J. Physiol., 134: 600-611, December 1956

Effects of Osmotic Pressure Changes on the Spontaneous Activity of Motor Nerve Endings. E. J. Furshpan, J. Physiol., 134: 689-697, December 1956

Electrical Events in Vision. L. J. Milne and M. J. Milne, Scient. Am., 195: 113-122, December 1956

Myelin Sheath During Degeneration and Regeneration II. Histochemistry. C. R. Noback and J. A. Reilly, J. Comp. Neurol., 105: 333-353, September 1956

The After-effects of Repetitive Stimulation on Mammalian Non-medullated Fibers. J. M. Ritcjie and R. W. Straub, J. Physiol., 134: 698-711, December 1956

The Effect of Anesthetic Agents on Skeletal Muscle Membrane. S. Thesleff, Acta physiol. Scandinav., 37: 335-349, 1956

The Effect of Cooling on the Size of the Action Potential of Mammalian Non-medullated Fibers. J .M. Ritchie and R. W. Straub, J. Physiol., 134: 712-717, December 1956

ORTHOPEDICS

Acute Osteomyelitis in Infancy. B. Wolman, Acta paediat., 45: 595-599, November 1956

Metatarsus Primus Varus and Hallux Valgus. Donald C. Durman, Arch. Surg., 74: 128-135, January 1957

New Traction Frame for Treatment of Low Back and Cervical Pain. F. Mason, O. Scott, H. Epstein and N. Minde, Industrial Med. and Surg., 26: 6-8, January 1957

Surgical Stabilization of the Paralytic Foot; General Considerations. Juan Farill, Postgrad. Med., 21: 79-82, January 1957

The Diagnosis and Treatment of Spina Bifida. F. Miles Skultety, Postgrad. Med., 20: 615-618, December 1956

The Influence of Shoes on Deportment and Gait. Svend M. Clemmesen, Postgrad. Med., 21: 43-51, January 1957

The Lesion of Morton's Metatarsalgia (Morton's Toe). Thomas M. Scott, Arch. Path., 63: 91-102, January 1957

The Management of Paralytic Scoliosis. John R. Moe, South. M. J., 50: 67-81, January 1957

Traction Therapy, A Study of Resistive Forces. B. Judovich and G. R. Nobel, Am. J. Surg., 93: 108-114, January 1957

POLIOMYELITIS

Antigenic Potency of Poliomyelitis Vaccine. Jonas E. Salk, J.A.M.A., 163: 1451-1458, Dec. 15, 1956

Indications for Vaccination against Poliomyelitis. John R. Paul, J.A.M.A., 162: 1585-1588, Dec. 29, 1956

The Problem of Post-Tonsillectomy Poliomyelitis: An Analysis of 888 Cases of Poliomyelitis from a District in the Southwest United States, 1949-1953. Charles F. Engelking, Laryngoscope, 66: 1541-1576, December 1956

What is Nursing in a Respirator Center? Evelyn M. Hamil, Am. J. Nursing, 57: 42-44, January 1957

REHABILITATION

The Utilization of Human Resources: A Philosophic Approach to Rehabilitation. Frederick A. Whitehouse, Dis. Chest, 30: 606-627, December 1956

Voice Rehabilitation Via Laryngeal Surgery and Speech Therapy. D. Woodman and S. Kastein, New York State J. Med., 57: 60-62, January 1957

Who's Disabled? Marguerite Parenti, Nursing Outlook, 4: 668-670, December 1956

Amputees in Industry. Charles Long, Arch. Phys. Med. & Rehab., 37: 766-769, December 1956

Clinical Application of Electromyography. Bernard J.

(continued on page 269)

The Physical Therapy Teaching Fellowship Program of the National Foundation for Infantile Paralysis

A critical problem facing all fields of education today is the lack of well trained teachers and administrators. This shortage has been recognized in physical therapy for many years. Enrollment in existing schools of physical therapy cannot be increased and new schools cannot be opened unless more qualified instructors can be found or trained. This will continue to be the controlling factor in the number of available qualified physical therapists in the country and will, of course, affect the total patient care program.

As early as 1945, a fellowship program was established by the National Foundation for Infantile Paralysis for qualified physical therapists interested in preparing to teach physical therapy, to develop and administer schools of physical therapy, and to promote sound principles of education for the profession. Over the years the program has continued until in April, 1957, there were 61 physical therapists who had completed fellowships or who were enaged in such programs. An evaluation of the teaching fellowship program and a re-statement of its objectives were undertaken early this year. This was done through appropriate committees representing the professional association and the advisory committees of the National Foundation. As a result of these meetings the purposes have been re-confirmed and the criteria for the program of study to be undertaken by a teaching fellow more clearly defined. The following is presented as a further interpretation of the teaching fellowship program.

Purpose of Teaching Fellowships

The program is designed to assist those physical therapists who are interested in positions of leadership in physical therapy education and whose previous education and experience have prepared them to undertake such a program of study. In addition to filling faculty positions in physical therapy teaching programs, both undergraduate and graduate, it is hoped that these fellows will be instrumental in planning and developing new schools and in undertaking research of importance to the growth of the field of physical therapy.

Eligibility Requirements

The applicant should hold the baccalaureate degree and should be a graduate of a physical therapy curriculum which is approved by the American Medical Association Council on Medical Education and Hospitals. Three years of clinical experience in physical therapy are required. In exceptional cases, the experience requirement may be waived if credentials and references indicate that the applicant shows outstanding interest and promise of success in teaching. The candidate must be a citizen of the U.S.A. and must be in sound health as evidenced by his medical history and physical examination attested to by a physician.

Program of Study

The teaching fellowship applicant should plan a program of study which will give him a broad understanding of physical therapy and which will supplement his past education and experience. It was the opinion of the Fellowship Committee of the National Foundation that there are five distinct areas of endeavor which should be included in the proposed program, or in the candidate's prior education and experience.

1. Graduate study in physical therapy for which academic credit is given by the college, university or medical school

It is standard procedure in established departments of a college or university that the faculty have qualifications in their particular field beyond the level at which they are expected to teach. It would be considered perfectly logical for a department of physiology to appoint its faculty from among those qualified because of ability demonstrated by advanced study in physiology. It should also follow that if a qualified physical therapist is interested in teaching, he should undertake study in physical therapy over and above that which he had as a student.

Furthermore, if physical therapy is to advance as a profession, research and study at a level beyond that required in the basic curricula is essential. By insisting upon graduate study in physical therapy for teaching fellows, it is hoped in an

indirect way: a) to stimulate interest in graduate-level education in physical therapy; b) to increase the amount of scientific research in physical therapy; c) to add to the number of physical therapists qualified to direct and develop graduate and research programs.

The amount of graduate work in physical therapy to be undertaken by the applicant will depend upon his previous experience and education in this field.

2. Advanced study in one field related to physical therapy beyond that required in the basic curriculum (e.g., physiology, anatomy, psychology and statistics)

Much of the knowledge on which physical therapy is built comes from the basic medical sciences, the social sciences, and the physical sciences. The physical therapy instructor should have reasonably extensive knowledge of at least one of these allied areas. His program, therefore, should include appropriate advanced study in one of these fields.

3. Formal courses in education and administration

It is important for those who desire teaching as a vocation to be cognizant of trends in education and to be well grounded in educational philosophy and technics. A good teacher should have adequate preparation in methods of teaching, tests and measurements, curriculum organization, and technics of guidance and counseling. He should have an appreciation of concepts of interpersonal relations which will enable him to work effectively both with students and other educators.

Formal course work in the field of education should prepare the potential teacher for the diversified demands of the teaching profession.

4. Broad clinical experience in physical therapy with more than average competency in at least one area

It would never be expected that any one instructor should have expert knowledge of all phases of physical therapy, but it is only logical to expect him to have a general over-all knowledge of his profession, clinically as well as didactically. A natural predisposition to some one area is usual in most persons. If special competency has not been achieved by prior experience, it would be profitable for the fellow to include academic and clinical training in at least one area during the tenure of his fellowship. Conversely, if his clinical practice has been quite specialized, he should seek to broaden his experience.

5. Supervised experience in teaching and administration in an approved physical therapy program which is an integral part of a college, university, or medical school offering the baccalaureate degree to physical therapy majors

The administrative problems and opportunities which exist in collegiate programs are not the same as those of the hospital-school facility. The trend in physical therapy education towards the degree program has been very evident in the past 12 years. In 1945 there were 32 schools offering the certificate in physical therapy (8 of these were Army schools) with only 7 offering the B.A. degree. Today 30 schools offer the certificate whereas 27 offer the B.A. degree as integral departments of universities or medical schools. There are but 8 schools remaining which offer only the certificate upon completion of the physical therapy curriculum, and 2 other schools which have an arrangement whereby a degree is awarded by another institution.

In view of this trend, it was deemed advisable that experience in the university-type facility which offers a degree in physical therapy be an essential part of the training of a teaching fellow.

DEGREES

The National Foundation teaching fellowship does not specifically designate that the fellow must be a candidate for an advanced degree. The candidate may prefer to plan a program of study in a wide variety of fields but which would not enable him to satisfy the specialized degree requirements of a particular university.

If the fellowship applicant is a candidate for an advanced degree, the only stipulation is that the degree contribute to the applicant's future in physical therapy education. Thus, as long as the requirements of the fellowship are met, the fellow may take a degree in such areas as physiology, education, psychology, etc.

If the candidate already holds the master's degree, he may plan to complete the Ph.D. or Ed.D. A candidate who does not hold a graduate degree and who wishes to plan a program for the doctorate, may plan this program in one of two ways: 1) He may bypass the M.A., subject to approval of the university and go through for the Ph.D., or 2) as is more frequently the case, the candidate may first plan to complete the M.A. At such time as he can show evidence of successfully completing the first objective, he may apply to the N.F.I.P. Committee for continuation of the fellowship for the doctorate.

DURATION OF FELLOWSHIP

Physical therapy teaching fellowships are awarded for full time study only. A minimum program of one academic year may be planned if the applicant has had broad clinical and teaching experience. In most cases, however, the program will have to be longer than the minimal year. Experience has shown that if the fellow is a candidate for the M.A. degree in physical therapy, he will usually require two years to fulfill the minimum requirements for the teaching fellowship. If the degree is to be awarded in another field, the program is necessarily weighted in that direction and a longer time may be needed to satisfy the requirements in the field of physical therapy teaching.

The maximum duration for a teaching fellowship is three years.

PLACE OF STUDY

There is no stipulation that the program for the fellowship be limited to study in one university. If the fellow wishes to satisfy the teaching fellowship requirements in more than one institution, or if he must transfer to complete certain of the requirements, he should clearly state his reasons for this plan to the committee.

OBLIGATION OF THOSE ACCEPTING FELLOWSHIPS

Each fellow should affirm his intention, that upon completion of the fellowship he will accept a position on the faculty of an approved physical therapy school and will continue in such a position for at least two years. The teaching fellowship is limited to the preceding objectives and at this time does not include preparation for clinical supervisors.

HOW APPLICANTS ARE CHOSEN

All teaching fellowship applications are approved or rejected on a competitive basis by the Clinical Fellowship Committee of the National Foundation for Infantile Paralysis. This committee is composed of a group of outstanding representatives from the field of medicine and education, and is the same one which has responsibility for consideration of fellowships in the fields of clinical medicine.

The Clinical Fellowship Committee meets three times a year. Prior to that time, on specified dates, completed application forms and other credentials must be filed with the Division of Professional Education of the National Foundation. The staff of this division examines and processes each application to be certain that all prerequisites have been satisfied, and that the proposed program of study is in line with the purpose of the fellowship. All of the data concerning a candidate are then duplicated and sent to each committee member one month prior to the date of the meeting. This is done in order to provide ample time for consideration of the qualifications of the candidate.

Personal interviews may then be arranged with the candidate to permit the committee to confirm or revise any judgment or impression they have made regarding the applicant from all of his submitted credentials. All decisions of the committee are final.

Any qualified physical therapist who is interested in teaching and who has the necessary qualifications for a teaching fellowship, may secure application forms from:

The Division of Professional Education
National Foundation for Infantile Paralysis
301 East 42nd Street, New York 17, New York

Editor's Note: Guidance and counseling for those interested in planning a teaching fellowship program may be obtained from directors of physical therapy schools, or the Education Consultant of the American Physical Therapy Association.

Editorial

Medical Education Week

Recently the American Physical Therapy Association was asked by the medical societies to assist them in promoting Medical Education Week which will be observed this year from April 21 to 27. This Week is sponsored by the Association of American Medical Colleges, American Medical Association, American Medical Education Foundation, National Fund for Medical Education, Student American Medical Association and Woman's Auxiliary to the American Medical Association. The purpose is to familiarize the public with the story of the dramatic progress made in the medical schools of the United States and to emphasize their contribution in furnishing doctors, in conducting research, and in participating in professional and community services.

Because physical therapists depend on the medical schools for an essential part of their education, and because of the close working relationship and interdependence of physical therapy and medicine, it is imperative that all myths and false rumors regarding medical education be dispelled.

At present in the United States there is 1 doctor for every 730 persons. Since 1910 there has been an increase in general population of 80 per cent as compared with a 120 per cent increase in physicians graduating from approved medical schools. In this period the student enrollment more than doubled, while the number of schools increased from 66 to 82, or roughly a new educational institution was approved every two years. Four completely new schools are in the process of development. This is phenomenal in that to be approved each school must meet requirements for suitable classrooms, teaching hospitals, library, clinics, and a well integrated program of instruction. Each physician now graduated in the United States is fully competent to practice medicine. This was not true 30 or 40 years ago. At the turn of the century "diploma mills" or substandard schools were investigated and closed, and by 1929 there was no longer a need to rate schools in categories of A, B, or C.

The faculties of medical schools no longer limit their teaching responsibilities to undergraduate medical students. They provide instruction for more than 50,000 others, or twice as many as the medical undergraduate students. Some of the auxiliary branches

Editorial

include dentistry, physical therapy, occupational therapy, nursing, pharmacy, and medical technicians of various specialities. Advanced or review courses have been offered for practicing physicians in increasing numbers. Thus, through the doors of the medical schools passed approximately 86,000 students in 1954-55.

Over half of the premedical students applying for admission were accepted in the freshman class. Since there is no limit to the number of applications a person can make, there is a large discrepancy between the actual number of applicants and the applications submitted. This has been a source of confusion and has led some people to arrive at a rejection rate of three or four times too high. In selecting applicants for medical school, careful consideration is given to such qualities as character, personality, leadership, and other nonscholastic factors. During 1955-56 15.8 per cent of the class had an average college grade of A, 70.6 per cent B, and 13.6 per cent a C average. Improved screening methods have steadily decreased failures and withdrawals in the first and subsequent years.

Medical Schools receive financial support from the state, municipal, and federal governments, endowment incomes, tuitions, general university funds, gifts, and grants. The National Fund for Medical Education and the American Medical Education Fund solicit contributions from voluntary sources to support these institutions. Although medical schools do need additional income they are better supported today than at any time in history.

During the week of April 21 the physical therapist will have opportunity to assist in telling the public the facts about medical education. In this small way the physical therapist can express his appreciation to the physician and medical schools as well as contribute to public relations.

Physical Therapy Fund, Inc.

Total contributions to the Fund as of March 15, 1957 are $4,926.25. This represents the response of 361 contributors. A list of Charter Donors, those who contributed prior to March 15th, will be published in the May issue of the Review.

Our first president, Mary McMillan, was a generous contributor and wrote as follows:

"Hurrah for all of the American Physical Therapy Association who have the vision as described in the Membership Newsletter.

"I am indeed proud to do my small bit to promote so worthy a cause for better establishment of our physical therapy profession. I am extremely interested in the endeavor and feel sure you will win.

"So best of luck from one of your oldest members."

MOLLIE MCMILLAN

It has been gratifying to receive other letters of commendation and approval along with the contributions. We know that many others are planning to send contributions and to make this an annual habit since the Fund is to be perpetuated. The Directors plan to award grants from the Fund this summer so that we may begin the fulfillment of our stated purpose and qualify for a favorable ruling in regard to tax-free status.

WORLD CONFEDERATION FOR PHYSICAL THERAPY *News*

Executive Committee to Meet in June

The Executive Committee of the World Confederation for Physical Therapy will meet in Selwyn College, Cambridge, England during the week of July 14, 1957. Members of this Committee are:

Miss G. V. M. Griffin	President (Great Britain)
Miss Mildred Elson	First Vice-President (U.S.A.)
Mrs. R. Agersnap	Second Vice-President (Denmark)
Mr. J. Dupuis-Deltor	Third Vice-President (France)
to be appointed	Australia
Miss G. Gower-Rees	Canada
Miss C. Fellenius	Sweden
Miss Sylvi Honka	Finland

World Congress ISWC

Physical Therapists who will attend the Seventh World Congress of the International Society for the Welfare of Cripples in London from July 22 to July 27, 1957, will be privileged to attend a special luncheon on Tuesday, July 23, at St. Ermin's Hospital. The luncheon is being planned by the World Confederation for Physical Therapy and a number of distinguished guests who are attending the Seventh Congress of ISWC will be invited to attend. The cost of the luncheon will be £1. Those planning to attend are requested to send their money in advance although reservations may be paid after arrival in London. All physical therapists wishing to attend are requested to notify

Miss M. J. Neilson, Secretary
Chartered Society of Physiotherapy
Tavistock House (South) Tavistock Square
London W.C. 1, England

Information about the Seventh World Congress may be obtained from the International Society for the Welfare of Cripples, 701 First Avenue, New York 17, N. Y.

Administration Course Planned

Physical therapists attending the Congress of the International Society for the Welfare of Cripples to be held in London from July 22 to 26 are invited to enroll in a residential course on Administration, organized by the Chartered Society of Physiotherapy and held at Selwyn College, Cambridge, England. The course will open July 17 and close July 20. The program of the course is as follows:

Wednesday, July 17

12:00 noon.	Registration.
1:00 P.M.	Lunch.
2:30 P.M.	*What is Administration?* by Mr. H. A. Goddard, Management Consultant.
4:00 P.M.	*Logical Thinking and Problem Analysis,* by Mr. H. F. Walker, Education and Training Department of Messrs. Kodak, Ltd.
Evening.	Visit to theatre.

Thursday, July 18

9:30 A.M.	*The Role of the Physiotherapist as Administrator,* by Mrs. N. Barnett, M.A., Deputy Head of the Department of Education, University of Birmingham.
11:15 A.M.	*Human Relations,* by Miss E. M. Pepperell, Assistant Director of the Industrial Welfare Society.
2:15 P.M.	*Personnel Management,* by Miss E. M. Pepperell.
8:00 P.M.	An International Evening. (Members of the Course will meet members of the Chartered Society of Physiotherapy's East Anglian Local Board and Cambridge Branch, and also the Executive Committee of the World Confederation for Physical Therapy, which will also be holding its meetings in Selwyn College during the period of the Course.)

Friday, July 19

9:30 A.M.	*Report Writing,* by Mr. S. G. Hill, LL.B., D.P.A., F.H.A., Secretary, Northampton and District Hospital Management Committee.
11:15 A.M.	*Principles of Group Discussion,* by Mrs. E. W. Parsons, M.A., Examiner, University of London and other Universities.

2:15 P.M. *Practice in Group Discussion*, conducted by Mrs. E. W. Parsons, M.A.
4:15 P.M. Any Questions?
8:00 P.M. *The Organization of Physiotherapy Departments.* Discussion by three Chartered Physiotherapists.

Saturday, July 20

9:30 A.M. *Physiotherapists and the Law*, by Mr. D. C. Norris, F.R.C.S., Barrister-at-Law.
11:15 A.M. *Leadership*, by Mr. A. C. Stuart Clark, M.A., Deputy Principal, Hospital Administrative Staff College.
12:00 noon. Discussion on Course.

The fee for the course to members of the American Physical Therapy Association is £4. 2s. 6d. and the charge for full board and residence, plus service, from Wednesday mid-day to Saturday after lunch is £4. 15s. 6d. Members who are interested in attending should write for further information to:

Miss M. J. Neilson, Secretary
The Chartered Society of Physiotherapy
Tavistock House (South)
Tavistock Square, London, W. C. 1, England.

International Meetings — July 1957

Two meetings of interest to physical therapists will be held in Europe during July, 1957. The Fourth International Poliomyelitis Conference will meet in Geneva, Switzerland, July 8 through 12 and the Seventh World Congress of the International Society for the Welfare of Cripples will meet in London, July 22 through 26.

In preparation for the International Poliomyelitis Conference some 60 governments have been invited to send representatives as official delegates to present summarizations of the problems of poliomyelitis in their respective countries. The Scientific General Sessions will include the following subjects:

Vaccination Against Poliomyelitis
Enteric Viruses Producing Disease Simulating Poliomyelitis
Studies on Cultured Mammalian Cells
General Considerations of Viruses
Basic Problems of Respiratory Distress in Patients with Poliomyelitis
Care of Patients Severely Stricken by Poliomyelitis
Diagnosis
Group and Home Care of Patients with Respiratory or Extensive Paralysis

Further details regarding the Conference may be obtained by writing to:

Stanley E. Henwood, Executive Secretary
International Poliomyelitis Congress
120 Broadway, New York 5, N. Y.

The theme of the Seventh World Congress of ISWC will be "Planning for Victory Over Disablement — The Advance, Integration and Application of Knowledge." Sectional meetings will relate the theme to Childhood, Adult Life, and the Elderly.

Special group meetings will consider Multiple Sclerosis, Cerebral Palsy, Prostheses and Braces, Epilepsy, Education, Arthritis and Rheumatism, Poliomyelitis, Muscular Dystrophy.

Further information may be obtained by writing to:

Donald V. Wilson, Secretary General
International Society for the Welfare of Cripples
701 First Avenue, New York 17, N. Y.

Lawrence Linck Goes to Brazil as Rehabilitation Consultant

Lawrence J. Linck, former executive director of the National Society for Crippled Children and Adults, has accepted a short-term appointment in Brazil, where he will serve as consultant to voluntary organizations working for the physically handicapped, it was announced by Donald V. Wilson, Secretary-General of the International Society for the Welfare of Cripples.

At the invitation of the ISWC National Affiliate in Brazil, the Association for the Aid of Crippled Children, (*Associacao de Assistancia a Crianca Defeituosa*), Mr. Linck will spend six weeks in Sao Paulo developing the organizational structure of voluntary groups, with a view toward a closer coordination of their services, fund raising technics, and approach to public education.

Mr. Linck has long been in the forefront of the American public health and rehabilitation movements. As the director of the National Society for more than a decade, he conceived and guided a nation-wide program of education, research and direct services for the disabled in which more than 2,000 state and local societies cooperated. He is a member of the Council of the International Society for the Welfare of Cripples; a member of the Executive Committee of the National Society for Crippled Children and Adults; a consultant to the American Public Health Association; and a member of many other major United States rehabilitation groups.

CONFERENCE 1957

DETROIT, MICHIGAN
JUNE 23-28 · HOTEL STATLER

Business Meetings and Program Schedule

June 20, 21 and 22 — **Board of Directors Meetings**

Sunday, June 23

9:00 A.M. — 5:00 P.M. — Section on Education
Self-Employed Section
Members in Public Health Work

5:00 P.M. — 8:00 P.M. — **Reception**—Michigan Chapter, Host

Monday, June 24

9:00 A.M. — 12:00 Noon — **Delegates' Registration**

9:00 A.M. — 5:00 P.M. — **General Registration**

10:00 A.M. — 12:00 Noon — Group Meetings—Veterans Administration, Crippled Children's Societies, State Examining Committees, Research Group, Arthritis and Rheumatism

2:00 P.M. — 5:00 P.M. — Opening Session—Greetings, President's Address, Keynote Speech: LAYING THE CORNERSTONE FOR LIVING THROUGH GROWING, LEARNING, DOING—Louis A. Schwartz, M.D., Assistant Professor of Psychiatry, Wayne University Medical School

7:30 P.M. — 10:00 P.M. — Discussion of Bylaw and Code of Ethics Amendments

Tuesday, June 25

9:00 A.M. — 12:00 Noon — **House of Delegates**

2:00 P.M. — 5:00 P.M. — THE CHILD WITH AN ACQUIRED DISABILITY

The Growth and Development of a Normal Child, Louise Bates Ames, Ph.D., Director of Research, Gesell Institute of Child Development, New Haven, Connecticut

The Medical and Psychological Aspects of Childhood Disease and Acquired Disability, Samuel S. Bernstein, M.D., Associate Professor Pediatrics, Wayne University

Orthopedic Problems in the Developmental Years—Preventive and Reconstructive Management, Francis P. Walsh, M.D., Orthopedic Surgeon, Detroit

Physical Therapy for Children, Carolyn Bowen, Physical Therapy Consultant, Washington State Department of Health

7:30 P.M. — 10:00 P.M. — **Film Theater**

Wednesday, June 26

9:00 A.M. — 11:30 A.M. — **House of Delegates**

2:00 P.M. — 5:00 P.M. — THE CONGENITALLY DISABLED ADOLESCENT APPROACHING ADULTHOOD

The Normal Adolescent—His Growth and Development, Louise Bates Ames, Director of Research, Gesell Institute of Child Development

A Medical Caseworker Looks at the Physically Handicapped Adolescent, M. Genevieve Blakeley, Executive Director, Detroit Orthopedic Clinic

The Neurophysiology of Congenital Brain Lesions, Elizabeth C. Crosby, D.Sc., Department of Anatomy, University of Michigan

Special Education for the Disabled, Anna M. Engel, Consultant, Detroit Association for Retarded Children, Inc.

The Function of the Physical Therapist in Program Planning for the Adolescent Patient, Edward N. Norris, Chief Physical Therapist and Medical Coordinator, Lansing Public Schools, Lansing, Michigan

Wednesday, June 26

6:00 P.M. — 7:00 P.M.	**Reception for Board of Directors**
7:30 P.M.	**Annual Banquet**

Thursday, June 27

9:00 A.M. — 12:00 Noon	A SERIOUS ACCIDENT DURING THE CAREER YEARS The Adult as a Contributing Member of Society, Jerome Pollack, Program Consultant, Social Security Department, United Automobile Workers Functional Anatomy of the Trunk, Meryl Miles, Associate Professor, Department of Anatomy, University of Wisconsin Management of Back Injuries, Henry S. Wieder, Jr., M.D., Assistant Professor of Orthopaedic Surgery, Graduate School of Medicine, University of Pennsylvania and Eugene Michels, Staff Physical Therapist, Graduate Hospital, University of Pennsylvania Vocational Rehabilitation from the Viewpoint of the Employer and the Employee, John J. Lee, Ph.D., Coordinator, Rehabilitation Training, Wayne University
2:00 P.M. — 3:00 P.M.	Demonstration of Child Amputee Program
3:00 P.M. — 5:00 P.M.	Original Papers (Prepared and read by members)
7:30 P.M. — 10:00 P.M.	**Film Theater**

Friday, June 28

9:00 A.M. — 12:00 Noon	LIVING FOR THE MATURE YEARS The Physiological and Pathological Foundations of Restorative Medicine in the Aging, Michael M. Dasco, M.D., Associate Professor of Clinical Physical Medicine and Rehabilitation, New York University College of Medicine Physical Therapy in Geriatrics, Geneva Johnson, Chief Physical Therapist, Eugene Talmadge Memorial Hospital, University of Georgia Financial Planning for the Later Years, Helen Randall, Director, Occupational Planning, Department of Welfare Federation of Cleveland What Do the Mature Years Offer? Morris Adler, Rabbi, Congregation Shaarey Zedek, Detroit
2:00 P.M. — 5:00 P.M.	**House of Delegates** **Visits to Local Physical Therapy Departments**

A recess will be scheduled each morning and afternoon to visit exhibits.

Conference Facts

Hotel

Not only is the Hotel Statler convenient to all travel terminals, it is also located in the heart of business, theater, and shopping districts. Churches of all denominations are within walking distance. All meeting rooms and many bedrooms are air-conditioned.

Rates

Single rooms and bath begin at $7.00. Rooms with double bed and bath for two and twin-bedded rooms and bath start at $11.50. Suites for two begin at $26.00. For each additional person, more than two, in double or twin-bedrooms, the extra charge is $3.00 a day. Lower rates apply to shower only; tub and shower are higher.

Hotel Reservations

For your convenience in making reservations directly with the hotel, reservation cards will be included in the dues notices. Those persons planning to room together should send in only one reservation, listing names of all roommates. If a room at the rate requested is unavailable, one at the nearest available rate will be reserved. When single rooms are filled the hotel will assign roommates.

Registration

Active and Inactive Members	$5.00
Student Members	1.00
Other Physical Therapy Students	2.00
Members of Physical Therapy Organizations Affiliated with the World Confederation for Physical Therapy	5.00

Advance registration is encouraged. If you do not register in advance you *must* present your membership card when you register at the Conference. Look for the advance registration card in your dues notice. Advance registration cannot be accepted after June 1, 1957.

Physical therapists who have graduated from approved schools but are not members of the

Association may attend the general sessions on presentation of credentials and payment of a registration fee of $15.00.

Exhibits

Technical exhibitors should make application to Gordon M. Marshall, Exhibits Manager, 30 West Washington Street, Chicago 2.
Scientific exhibitors should apply to the American Physical Therapy Association, 1790 Broadway, New York 19.

Film Theater

Members or organizations desiring to show movies, slides, or filmstrips at the Annual Conference may apply for inclusion in the program. Visual aids of special interest are related to subject areas of the scientific program: growth and development, special education, vocational rehabilitation, psychological adjustment to handicaps, orthopedics, neurophysiology, functional anatomy of the trunk or back, and geriatrics.

Applications should be sent to the American Physical Therapy Association by May 1, 1957, and should contain the following information:

Title of film, slides, or filmstrip;

Producer and/or distributor's name and address;

Technical data: black and white or color; sound or silent; film or slide size; running time of film, or number of slides and time needed to show them; year produced;

Name or organization sponsoring participation in film theater and of person who will be responsible for material.

The Program Committee will select for the Film Theater those films and slides which in its judgment will be of greatest interest to the audience, which best relate to subject matter, and which will fit into the time allotted.

Original Papers

Time has been provided for the reading of selected original papers on Thursday afternoon. Reports on new projects, evaluations, methods of treatment or modifications of physical therapy procedure will be considered. Send an abstract of your paper to Marcia Shaw, 28271 Jefferson Avenue, St. Clair Shores, Michigan, no later than April 1, 1957.

Arthritis and Rheumatism Meeting

Physical therapists attending the 34th Annual Conference in Detroit will have an opportunity to hear about recent developments in the field of arthritis and the rheumatic diseases at a special session to be conducted by Dr. R. W. Lamont-Havers, Associate Medical Director of the Arthritis and Rheumatism Foundation, New York.

Dr. Lamont-Havers, one of the nation's foremost authorities on the rheumatic diseases, will speak at a meeting scheduled for the morning of June 24. Physical therapists associated with ARF chapters as well as all other members of the American Physical Therapy Association interested in the arthritis problem are invited to attend.

Second Annual Meeting

Self Employed Section
of the
American Physical Therapy Association

Hotel Statler—Detroit, Mich.

Sunday, June 23, 1957

8:00 A.M. 9:30 A.M. Registration
9:30 A.M. 10:00 A.M. Professional Relations
10:00 A.M. 10:30 A.M. Professional Problems
10:30 A.M. 11:15 A.M. Income Survey
NOON—Executive Committee Meeting
2:00 P.M. 4:30 P.M. Business Meeting

Agenda—Business Meeting—

Call Meeting to Order

Introduction of Section Officers and Dignitaries
Announcements

Reading of Minutes of New York Meeting by Recording Secretary, Ed Rathjen.

Approval of Minutes

Reports of Standing Committees and Officers

Nominations Committee — Slate of Officers — Charles Magistro—

Formal Nominations from floor and written ballot by all section members

Conference Planning Committee ..... Marion Boyer
Vice-Chairman ..... Marion Boyer
Corresponding Secretary ..... Hal Feldman
Treasurer ..... Routh Dixon

Reports of National Study Committees

Committee on Printed Forms ..... Eloise Draper
Committee on Ways and Means ..... Nick Peters
Committee on Relations ..... Louis Pozarny
Bob Dicus
Committee on Insurance ..... Charles Magistro
Committee on Legislation ..... Joseph Breuer
Committee on International Relations .....
Hyman Jampol

Old Business

Recommendations of last year's meeting—Bob Dicus
Other

New Business

Proposed amendments to Rules of Order
Introduction of new officers ..... Charles Magistro
Tape library on specific topics .. other literature
Plans for future ..... wishes of membership
Membership qualifications ..... criteria

Final Announcements—New Committees Announced

Adjournment

Tuesday, June 25, 1957

Breakfast or luncheon ..... guest speaker

Living—Through Growing, Learning, and Doing

In many respects, the building of a life is not unlike that of building a house — intelligent planning is paramount for both. This includes selection of a suitable location to meet the desired needs, the best ingredients vital for strength and durability, concentrated supervision during construction, and a surrounding atmosphere of culture and beauty.

Before actually building a house, detailed consideration is given to choosing a terrain which will compliment the architectural plan, will provide protection from the extremes of weather, and will meet the requirements fundamental for everyday living. Similarly, in planning for a family, good judgment and discrimination should be used in selecting an environment conducive to the child's optimum development. This choice should satisfy the particular needs of physical, educational, and spiritual opportunities.

Once the site is obtained, careful attention is directed toward the building materials. Just as the best lumber, bricks, and fixtures are important to a house, so also are proper building foods essential to a healthy body. A foundation made of the improper proportions of sand and cement may crumble and crack; a mother inattentive to the prescribed regime during pregnancy may jeopardize the future well-being of the child. Unseasoned timber produces a warped and sagging frame for a house; a skeletal system lacking sufficient minerals may result in malformed bones or retarded growth. The correct materials properly balanced and in sufficient quantity are the basis for a good house or a healthy body.

Ingredients per se, while important will never guarantee the end results of either the house or the life of a person. The artistic handling of the material by the creators, the sequential pattern of building, and the influence of spatial and temporal forces all affect the finished product.

As the house is built, there is a blending and molding of a variety of materials by numerous skilled workmen; this eventually emerges in a unified structure of beauty and dignity. As the seed of life grows, new cells are added through division, systems differentiate, and there are changes in body proportions. Postnatally the completely dependent infant develops physically, emotionally, and mentally into an independent adult.

There is an important difference between the building of a house and the development of a child. Construction materials of brick and timber are passive and must be used or manipulated, while the growth and development of life is a dynamic process inherent in the individual and is influenced by innumerable elements in the environment.

Relative to the house, construction follows a definite order within the concept of the whole. Each step is an entity and a determinant for the course of action to follow. In general, the fineness of each procedure effects the end result and cannot later be changed without weakening the structure or marring the total beauty. This is comparable to the growth pattern in man. Here the changes proceed in an organized and integrated manner, one stage of development giving way to the next, the first being the basis for those to follow. While, in some instances, one phase of development may appear to outstrip another temporarily, the whole process is toward maturation.

During this ever so important period of building, the forces of nature may influence the finished product. Adverse conditions will test the strength and durability of the structure which has been erected and any weakness or frailty will be apparent.

While a well built house contributes to the joy of living it is not alive or capable of growth. The 34th Conference program of the American Physical Therapy Association will be alive and conducive to intellectual growth. Let us share the stimulating sessions on *Living — Through Growing, Learning and Doing.*

Courtesy of Detroit Convention and Tourist Bureau

Though more than 1,000 miles inland, Detroit is a port of call for ocean ships—and the nation's second largest foreign trade gateway. Here, ships from Europe load up with autos at Detroit docks. In background Ambassador Bridge which links Detroit and Canada, and the Detroit skyline.

Not Everything in Detroit Is Dynamic

After you have checked in at the Statler in June, you are entitled to a stroll around Washington Boulevard which is right outside the front door. Here, in an area of five blocks, is the most concentrated shopping district of any major city. In a matter of ten minutes you can walk to the River, view the new Civic Center, and new Ford Auditorium. Before you are in this large city one day, you will realize how the Detroit River has captured the title of the world's busiest waterway. However, this River is also a playground, and you may enjoy a band concert under the stars or a river cruise in the moonlight.

No visitor in June should miss seeing Detroit's industrial might in action. Depending upon your choice in cars, you can watch your favorite model being transformed from raw ore to a finished automobile—one that you might well drive away at the end of the Conference.

Just north of Detroit, in rolling Bloomfield Hills, are the Cranbrook Institutions, which are world famous for their combination of beautifully landscaped park, outstanding museum, and schools. Here you can cover everything from outstanding sculpture to a typical dinosaur's habitat.

History comes to life at Greenfield Village. Here you can see—not replicas—but the real thing, restored to picture the way of life of our fathers and grandfathers.

If you are a sports fan, you can watch the Tigers try again for a chance at the pennant, or swim at Metropolitan Beach, one of the largest fresh water swimming areas. Wherever your interest may lie, Detroit has an area to suit your particular fancy.

See you in June!

Professional Visits

The Michigan Chapter has arranged a schedule of professional visits to observe activities in general hospitals, rehabilitation centers, special hospitals and clinics, vocational training and testing centers, and brace shops. More complete information will be available after you arrive in Detroit. The following centers of interest to members will welcome visitors:

General Hospitals

Mt. Sinai Hospital
Detroit Memorial
Henry Ford Hospital
Harper Hospital
Grace Hospital
William Beaumont Hospital
Providence Hospital
U. S. Public Health Hospital
Wayne County General Hospital
Veterans Hospital

Rehabilitation Centers

Rehabilitation Institute of Metropolitan Detroit
McGregar Center
Jewish Home for Aged
Detroit Institute of Physical Medicine and Rehabilitation
Great Lakes Steel Corp.

Special Hospitals and Clinics

Childrens Hospital
Muscular Dystrophy Clinic
Multiple Sclerosis Clinic
Detroit Cerebral Palsy Center
Sister Kenny Polio Hospital
National Society for Crippled Children

Vocational Testing and Training

Detroit League for Handicapped
Jewish Vocational Training Center
Goodwill Industries

Brace Shops

Wright and Filippis
Rowleys
Bocks
Coons
Brenner and Keffer

Social Events

Mixer

Many centuries ago an Athenian teacher reminded a student that there was no smooth "Royal road" to learning. With this in mind it is only fitting that the Michigan Chapter's

welcome to our guests, the Sunday Mixer, should be a "Tune Up." Just as any wise tourist puts his car in order for the rigors of the trip, we invite you to tune up the carburetor of your professional interests, adjust your timer to new ideas, relubricate old ones, and check your intellectual brake linings at the Michigan Mixer.

Conference Speakers

MERYL MILES

Meryl Miles, Associate Professor, Department of Anatomy, University of Wisconsin, is a graduate of and received the certificate in physical therapy at the University of Wisconsin in 1932. Miss Miles' physical therapy experience has included positions at Wisconsin General Hospital, Madison, Wisconsin; Convalescent Home, Children's Hospital of Michigan; and Shriners' Hospital for Crippled Children, St. Louis, Missouri. She was instructor in anatomy at Washington University School of Medicine for two years and has been associated with the anatomy department of the University of Wisconsin since 1946. Miss Miles is the author of numerous articles related to functional anatomy and is a member of a number of organizations including the American Association of Anatomists, American Association of Physical Anthropologists, and the American Physical Therapy Association. Miss Miles' topic at the Detroit Conference will be "Functional Anatomy of the Trunk."

CAROLYN BOWEN

Carolyn Bowen is Physical Therapy Consultant, Washington State Department of Health. Miss Bowen is a graduate of the Simmons College five-year program in public health nursing and received the certificate of physical therapy at Harvard in 1943. She served in the poliomyelitis epidemics in Topeka, Kansas, and Milton, West Virginia; and held the rank of Second Lieutenant, Medical Corp, A.U.S., 1945-1946. Miss Bowen participated in the Gamma Globulin and Poliomyelitis Research projects in Washington state, 1953-1955, and initiated the physical therapy aspects of the Juvenile Amputee Training Program in Washington state's Crippled Children's program in 1956. She is the author of several articles including "Posture Training for Adolescents" published in the March-April, 1948, issue of the *Physical Therapy Review.* Miss Bowen will present "Physical Therapy for the Junior Citizen."

Eugene Michels, Staff Physical Therapist, Graduate Hospital of the University of Pennsylvania, is a graduate of the University of Cincinnati and received the certificate in physical therapy from the Division of Physical Therapy, School of Auxiliary Medical Services, University of Pennsylvania, in 1951. Mr. Michels served with the Navy from 1944-1946. He is the author of "Physical Therapy in the Conservative Management of Back Injuries" published in the March, 1957, issue of the *Physical Therapy Review.* Mr. Michels will assist Henry S. Wiedner,

Jr., M.D., in presenting "Management of Back Injuries" at the 1957 Conference.

MICHAEL M. DASCO, M.D.

Michael M. Dasco, M.D., Associate Professor of Clinical Physical Medicine and Rehabilitation, New York University College of Medicine, is a graduate of the Royal Hungarian University of Budapest and a Diplomate of the American Board of Physical Medicine and Rehabilitation. Among his hospital appointments are those of Director, Service of Physical Medicine and Rehabilitation, Goldwater Memorial Hospital, New York; Consultant in Rehabilitation, Mary Manning Walsh Home; and Consultant, St. Barnabas Hospital. Dr. Dasco has served as Consultant and Special Consultant to many state and federal planning committees on aging including the National Conference on Aging, Educational Section, Washington, D.C.; Federal-State Conference on Aging, Washington, D.C.; and Governor's Conference on Problems of Aging, New York State. At present he is a Special Consultant to the United States Public Health Service, Bureau of State Services, Division of Special Health Services, Chronic Disease Branch. Dr. Dasco is a member of the Editorial Board, *Journal of Chronic Diseases* and is the author of many articles and bulletins on the subject of rehabilitation in the aged. Dr. Dasco's topic at the Conference will be "The Physiological and Pathological Foundations of Restorative Medicine in the Aging."

Morris Adler, Rabbi, Congregation Shaarey Zedek, Detroit, Michigan, is a graduate of City College of New York, and of the Jewish Theological Seminary, New York. Rabbi Adler was a Chaplain in the Armed Forces, 1943-1946. He will present "What Do the Mature Years Offer?" at the closing session of the Detroit Conference.

Edward N. Norris, Chief Physical Therapist and Medical Coordinator, Lansing Public Schools, Lansing, Michigan, is a graduate of the State Teacher's College, West Chester, Pennsylvania. Mr. Norris received the certificate in physical therapy at the University of Kansas in 1949 and the Master of Science degree in physical therapy at the Medical College of Virginia in 1954. Mr. Norris served during World War II as a Lieutenant in the Corps of Engineers, United States Army. His physical therapy experience has included positions at Villa Rose School for the Cerebral Palsied, De Soto City, Florida; University of Kansas Medical Center; and at the University of Michigan. Mr. Norris is co-author of "Fundamental Approach to the Study of Stance and Locomotion in Cerebral Palsy," published in the *Physical Therapy Review*, February, 1952. His subject at the Detroit Conference will be "The Function of the Physical Therapist in Program Planning for the Adolescent Patient."

APTA-OVR Institute, 1957

Fifty physical therapists who are teaching physics, physiology, or electrotherapy in the AMA approved schools of physical therapy have been awarded travelships to the Institute at the Extension Study Center of the University of Oklahoma. The faculty members are:

MARGARET BRYCE, B.S.
Physical Therapist and Occupational Therapist
Assistant Professor
Course in Physical Therapy
University of Wisconsin

RUBY DECKER, B.S.
Educational Director
School of Physical Therapy
University of Texas, Galveston Branch

ERNST FISCHER, M.D.
Research Professor of Physiology
Medical College of Virginia

JEROME GERSTEN, M.D.
Associate Professor and Chairman
Department of Physical Medicine and Rehabilitation

School of Medicine
University of Colorado
DOROTHY HOAG, M.A.
Physical Therapy Director
University of Colorado
THURMAN WHITE, PH.D.
Dean, Extension Study Center
University of Oklahoma

Program

Monday:

The Teaching Institute as a Dynamic Educational Experience—Dr. White
Physics of Electricity in Electrotherapeutic and Testing Procedures—Dr. Gersten

Tuesday:

Physiology of Membranes—Dr. Fischer
Electrical Testing Procedures—Misses Bryce, Decker, Hoag
Technics of Teaching—Dr. White

Wednesday:

Electromyography—Physiology—Dr. Fischer
Application of Electromyography—Dr. Gersten
Demonstration of Electromyography—Dr. Gersten
Electrical Stimulation of Muscle—Dr. Fischer
Clinical Application of Electrical Stimulation of Muscle—Misses Bryce, Decker, Hoag
Introduction to Course Organization—Dr. White
Course Organization Workshop—Dr. White, and Misses Bryce, Decker, Hoag

Thursday:

Physiology of Heat-Diathermy—Dr. Fischer
Physics of Ultrasound—Dr. Gersten
Ultrasonic Effects in Vitro and in Simple Biological Systems—Dr. Fischer
Effects of Ultrasound on the Whole Organism and Clinical Uses—Dr. Gersten

Friday:

Demonstration of the Clinical Application of Ultrasound—Dr. Gersten and Misses Bryce, Decker, Hoag
Total Laboratory Period—Whole Faculty
Evaluation of Effective Teaching and Summary of the Institute—Dr. White

Andrew H. Woods, M.D.

Dr. Woods, Honorary Member of the Association since 1921, died in Newton, Massachusetts, on Nov. 5, 1956. Dr. Woods was graduated from the University of Pennsylvania Department of Medicine in 1899 and was certified by the American Board of Psychiatry and Neurology. He was formerly director of the Iowa State Psychopathic Hospital in Iowa City and was professor emeritus of psychiatry at the State University of Iowa College of Medicine. At the time of his election to Honorary Membership in the Association he was serving on the faculty of the Peking Union Medical College in China.

Questions and Answers

Question

A salesman for an encyclopedia recently tried to give me a set of their books. When I inquired about obligation he stated that I would only be expected to write an endorsement which could be used for promotion. Is this ethical?

Answer

Such a practice by members would be an exploitation of their professional standing. Where our Code of Ethics is not specific we recommend that members be governed by usage in other professions such as medicine or nursing. The Code for Professional Nursing states "Professional nurses assist in disseminating scientific knowledge through any form of public announcement not intended to endorse or promote a commercial product or service."

Picture Yourself in Physical Therapy

A new career information-recruitment poster has been made. It is 10 x 14 inches, yellow, black and red. The design, lettering and photograph are attractive and tell a good story briefly and clearly. Request copies now for your spring recruitment activities!

Association News

Edythe F. Bingham, Tuskegee, Alabama, passed away recently. Miss Bingham received the certificate in physical therapy at Fort Huachuca, Arizona, in 1944. She served at Camp Livingston, Louisiana, from 1944 to 1946 and was most recently employed at the Tuskegee Veterans Administration Hospital. Miss Bingham first became a member of the Association in 1946 and was a member of the Alabama Chapter.

Recruitment Consultant

Elizabeth MacAuley, who assumed her position as Recruitment Consultant on the National Office Staff on Dec. 1, 1954, resigned on Feb. 28, 1957. Miss MacAuley contributed greatly to the Association's recruitment program by preparing materials for distribution to lay groups through all communications media and also gave able guidance to members and chapters in their recruitment efforts.

Miss MacAuley has accepted another challenging position. It is hoped that the Association will soon be able to secure a replacement for this important phase of our program.

Marriages

Janet Blomgren, of Fort Benning, Ga., to Philip W. Heathman, Claremont, Calif.

P. Joyce Booth, of Flint, Mich., to John O. Nichols, Flint.

Marguerite H. Christjohn, of Columbus, Ohio, to Richard B. Addis, Canton, Ohio.

Jean Cressy, of Pittsfield, Mass., to Elliott Barker, Albany, N. Y.

Virginia Ellett, of Sherman Oaks, Calif., to Edison F. McEntire, Chatsworth, Calif.

Ann Fleckenstein, of Pontiac, Mich., now Mrs. Ann F. Tenney, Pontiac.

Judith A. Kaplan, of Belmar, N. J., now Mrs. Judith K. Hurley, Bergenfield, N. J.

Miss Janet E. Kingett, of Seattle, Wash., now Mrs. Janet K. Campbell, Seattle.

Myrna Levine, of Ayer, Mass., now Mrs. Myrna L. Godfrey, Needham, Mass.

Alice Mitsudo, of Philadelphia, Pa., to Kiyoshi Sandow, Houston, Texas.

Catherine Quinn, of Sioux Falls, S. D., now Mrs. Catherine Q. Heiman, Kansas City, Mo.

Betty Steele of Roselle, N. J., now Mrs. Betty S. Toabe, Roselle.

Marion Wakeman, of Palo Alto, Calif., now Mrs. Marion W. Gewartowski, Palo Alto.

Chapter News

Illinois

The February meeting was a membership participation meeting. Four members contributed two demonstrations of equipment and two original papers.

The Illinois Hospital Association representing 285 hospitals in Illinois has set up a joint Committee on Paramedical Services, to determine how to meet public needs for special skills. Dorothy P. Wagner, Chief Physical Therapist, Michael Reese Hospital, will represent the Illinois Chapter, APTA, on the Committee.

The Illinois Chapter has planned an educational program to be held April 27-28 prior to the Physical Therapy Section, Tri-State Hospital Assembly. Attendance by members from Indiana, Wisconsin, and Michigan is anticipated. The subject of the program will be "Proprioceptive Neuromuscular Facilitation." Margaret Knott, co-author with Dorothy Voss of the recent book of the same title, will be the guest speaker.

The sessions will be held on the Saturday and Sunday, April 27 and 28, preceding the Tri-State Hospital Assembly which opens in Chicago on April 29. Association members planning to attend the Tri-State meetings are invited to participate. Registration fee is $3.00.

Address replies to:
June M. Schroeder
University of Illinois Research and Educational Hospital
840 South Wood
Chicago 12, Illinois

New Mexico

The January newsletter contains a directory of members, a full report of the November meeting, and news of the members' activities entitled "Around the State."

New York—Greater New York District

As a portion of the program meetings in January and February 1957, members participated in two panel discussions, "Problems Associated with a Maturing Profession" and "Does Self-employment or Hospital Work Offer the Greater Rewards to a Physical Therapist?"

Texas

DEAR MISS VOSS:

Here in Texas we have a rather unique organization which I believe warrants notice. The Texas Commission on Patient Care is sponsored jointly by the Texas Medical Association, Texas Hospital Association, Texas Graduate Nurses' Association, and the Texas League for Nursing. The Commission is interested primarily in improving patient care and, to this end, has established a Paramedical Committee. Twelve recognized paramedical groups are invited to be represented at these committee meetings, including occupational therapists, medical record librarians, vocational nurses, medical technologists, hospital pharmacists, x-ray technicians, dietitians, and physical therapists.

When the whole idea was presented at our executive board meeting, I must admit that I was the first to hoot at the idea. However, as Relations Chairman I felt obliged to attend their latest meeting, held this month in the Texas Medical Association building in Austin. In fact, five of our executive committee attended and we have been pretty well *sold* on the entire program. There are no gimmicks. . . this is a frank acknowledgement of the interdependence of the various phases of the medical field. Publicity funds are obtained from sources such as Blue Cross, Blue Shield, and equipment manufacturers.

I am enclosing a copy of the provisional By-Laws and a report of an earlier committee meeting, as well as their recent booklet "Deep in the Health of Texas." Our Exhibit Chairman has been asked to provide the committee with copies of our film "Within Your Hands" and other material. This is a good distribution agency here in the state. We feel we want to cooperate with them as much as possible. Mr. Wilson Wells is employed as a full-time Executive Secretary to the Commission. He is most helpful in case you want more information.

Sincerely yours,

MARY E. FRAZEE,
Chairman, Relations and Placement

New Booklets Available

The Clinical and Social Service Program of the Muscular Dystrophy Associations of America, Inc., is a 16-page booklet describing the procedures for development of these programs within a community and in existing hospital or rehabilitation facilities. *Patient Service Program* is a pamphlet describing the M.D.A.A.'s services to patients. Both are available upon request. Muscular Dystrophy Associations of America, Inc., 1790 Broadway, New York 19, N. Y.

SECOND LT. HOWARD A. APPLEBY, JR.

Member Goes to Saudi Arabia

Second Lieutenant Howard A. Appleby, Jr., one of the seven male physical therapists in the U. S. Army, has been selected as one of three Walter Reed Army Medical Center staff members to go to Saudi Arabia. He will give physical therapy to Prince Mashhur, son of King Ibn Saud of Saudi Arabia and will help train native personnel in the prescribed physical therapy procedures.

Lieutenant Appleby attended high school in Springfield, Massachusetts, and in 1954 received his bachelor of science degree in physical education from Springfield College. The following year he received his certification in physical therapy from New York University. He is a member of the American Physical Therapy Association.

During the polio epidemic of 1955, Lieutenant Appleby spent six months working as a physical therapist at Massachusetts General Hospital in Boston. He was commissioned in April, 1956, and assigned to an Army Orientation Course at Fort Sam Houston, Texas. Upon completion of the Army Orientation Course, Lieutenant Appleby was assigned to the Department of Physical Medicine and Rehabilitation at Walter Reed Hospital in May, 1956.

Proposed Amendments to the American Physical Therapy Association Code of Ethics to be Considered by the House of Delegates, June 1957

The following amendments to our Code of Ethics will be presented for action by the House of Delegates. They have been approved by the Board of Directors and are based on recommendations from the Judicial Committee, which has the responsibility for interpretation and enforcement of the Code of Ethics. In order to acquaint the members with the thinking of the Board of Directors a column of explanations has been included.

Every member is urged to study these and to help his chapter instruct Delegates how to vote in June.

PRESENT	PROPOSED	EXPLANATION
ARTICLE II	ARTICLE II	
RESPONSIBILITIES OF THE PHYSICAL THERAPIST TO THE PHYSICIAN	RESPONSIBILITY OF THE PHYSICAL THERAPIST TO THE PHYSICIAN	Editorial change for consistency with following titles of Articles.
ARTICLE II, *Section* 3 The physical therapist shall not continue treatment beyond *the* stated reexamination date without further orders from the physician. Changes of any consequence in the patient's condition occurring between interim visits shall be reported to the physician in charge without delay.	ARTICLE II, *Section* 3 The physical therapist shall not continue treatment beyond *a* stated reexamination date without further orders from the physician. (Remainder of Section 3 unchanged.)	Editorial change—Changing "the" to "a" conforms with Section 2 of Code referring to "if possible, re-examination date."
ARTICLE III, *Section* 1 Information of a confidential nature regarding patients gained from any source whatsoever shall be considered a serious trust by the physical therapist. Such confidences shall be well guarded at all times. *The physical therapist shall be discreet and tactful in all dealings with the patient.*	ARTICLE III, *Section* 1 Delete last sentence.	Editorial change—This sentence will be placed as leading sentence in Section 2.
ARTICLE III, *Section* 2 *The physical therapist* shall avoid all actions or statements which in any way might be construed by the patient as criticism of the physician in charge or his handling of the case. Likewise, disparaging remarks or implications concerning professional co-workers, particularly those who previously have dealt with the patient, shall be studiously avoided.	ARTICLE III, *Section* 2 *The physical therapist shall be discreet and tactful in all dealings with the patient and he* shall avoid all actions or statements which in any way might be construed by the patient as criticism of the physician in charge or his handling of the case. (Remainder of Section 2 is unchanged.)	Editorial change—This sentence properly belongs in Section 2 rather than Section 1.
ARTICLE III, *Section* 5 It is considered unprofessional for the physical therapist to accept gratuities.	ARTICLE III, *Section* 5 The physical therapist should not accept gratuities.	Reworded for consistency with other sections of Code.
ARTICLE III, *Section* 6 New section.	ARTICLE III, *Section* 6 The direct sale or rental of equipment, supplies, or publications as a part of physical therapy service is unethical except in those instances where the patient cannot readily procure these items from other sources. Any such sale or rental must be without profit to the physical therapist.	This section has been written for the guidance of members who provide this service to patients. The need for such guidance has been recognized because of cases referred to the Judicial Committee.

PRESENT	PROPOSED	EXPLANATION
ARTICLE IV	ARTICLE IV	
RESPONSIBILITY OF PHYSICAL THERAPISTS TO EACH OTHER, TO EMPLOYERS, AND TO THE PROFESSIONAL ORGANIZATION	RESPONSIBILITY OF THE PHYSICAL THERAPIST TO CO-WORKERS, EMPLOYERS, THE PROFESSION, AND THE PROFESSIONAL ORGANIZATION	Rewording of the title more clearly describes the content of the Article.
ARTICLE IV, *Section* 1	ARTICLE IV, *Section* 1	
Physical therapists shall give *their* full loyalty and support to the organizations *or* individuals with whom *they are* associated.	*The physical therapist* shall give *his* full loyalty and support to the organizations *and* individuals with whom *he* is associated.	Editorial change — Rewording is for consistence with other sections.
ARTICLE IV, *Section* 3	ARTICLE IV, *Section* 3	
In addition to applying the techniques of the profession to the best of his ability, the physical therapist shall constantly strive to improve his knowledge and proficiency.	In addition to applying the techniques of the profession to the best of his ability, the physical therapist *should* constantly strive to improve his knowledge and proficiency.	*Shall* is changed to *should* since this section cannot be mandatory. If mandatory, the section is not enforceable.
ARTICLE IV, *Section* 4	ARTICLE IV, *Section* 4	
New Section. (Present Section 4 becomes Section 5.)	The physical therapist may patent appliances and equipment or copyright publications, methods or procedures. However, retarding or inhibiting research or restricting the benefits which may be derived from such patents or copyrights is unethical.	This Section is presented for guidance of physical therapists in response to queries from members and to further emphasize that it is not ethical to exploit the profession.
ARTICLE IV, *Section* 4	ARTICLE IV, *Section* 5	(formerly Section 4)
The physical therapist should willingly participate in educational programs but in no instance may he associate himself with the education of physical therapy students in the United States of America where the graduates are not eligible for membership in the American Physical Therapy Association. Members who are so associated at the time of the passage of this amendment shall be disciplined if they continue in this capacity longer than one year following the adoption of this amendment by the House of Delegates of the American Physical Therapy Ass'n.	The physical therapist should willingly participate in educational programs which promote the welfare of the profession but shall in no wise associate himself with any program which misrepresents to its students the rights and privileges which shall be accorded to them upon completion of their training or which permits utilization of his skills and knowledge to the detriment of the profession.	This Section has been rewritten upon advice of our legal counsel.
ARTICLE IV, *Section* 5	ARTICLE IV, *Section* 6	(formerly Section 5)
In the interest of advancing the profession as a whole the physical therapist should join and give full support to the professional organization in its efforts to extend and improve the field of physical therapy.	The physical therapist should give his full loyalty and support to the professional organization in its effort to attain its objective.	Since the Code applies to members, "join" is not applicable. Other content of the present Section is covered in other sections of the Code.
ARTICLE IV, *Section* 6	ARTICLE IV, *Section* 7	(formerly Section 6)

Student Column

Until this issue these pages were headed "Student Section" with material following a pattern established in 1954. In December, 1956, the Editorial Board of the *Review* voted to revise the Student Section and rename it the Student Column to avoid confusion with organized groups within the Association which are designated sections.

Succeeding Student Columns will be published monthly instead of bi-monthly. Items will be selected from the variety submitted by student reporters from the approved schools of physical therapy. Additional items for the Column designed to provide background information about our Association will be prepared by the Editorial Board and other active members from time to time.

When You Write for a Job . . . .

June and graduation days will soon be here, and most students are beginning to think of their first job. What shall it be . . . a large or small hospital? A federal or local institution? Specialized work or more general experience first? What opportunities are open? The student will explore many areas, and in this process he will do much of his fact-finding through the medium of letters.

A letter of inquiry or a letter of application for a position is the first introduction to a prospective employer. Its purpose is to sell a candidate to an employer. A well written letter of application does not guarantee a position, but it will insure consideration if the letter has been properly executed. This kind of letter should state clearly the job for which you wish to be considered, and the source of your information about it. You cannot and should not narrate your whole life history in a letter, but you should "cover enough ground" to intrigue the prospective employer. The margin between belittling and boasting will achieve protection against boring. By interesting your employer in your qualifications, you take the first step in obtaining a position. A carefully written letter of application can open . . . or close . . . the door to the opportunity you want.

Letters of application should give a clear, concise picture of you, your accomplishments, and your aims. The letters should be simple, human, personal, and brief, without omitting any essential or pertinent facts. The following "Do's and Don'ts" should be considered in the composition of such letters.

Do Include

Your full name
Complete address
Date and place of birth
Marital status and number of children
Education (major subjects, dates and degrees)
Experience (place, supervisor, dates)
Brief outline of aims and ambitions
References (three or four)

Do Not Include

Family or personal problems
Previous misfortunes
Prejudices or complexes
Criticism of past jobs
Personal interests that have no bearing on the job
Details of early schooling

When composing the letter, mention a specfic job, or be specific about the kind of work you are prepared for and able to undertake. Never be too general or vague on this point or you may be ruled out as indecisive.

It is perfectly acceptable to ask the prospective employer to send to you any available information concerning personnel policies. This will usually give you necessary information about vacations, working hours, holidays, hospitalization and social security. You might also wish to make general inquiries about possibilities for advancement, for furthering your education, and for your general professional development. If possible, you should avoid any mention of salary in your first communication unless the employer has requested it in an advertisement or other communication.

The salutation of your letter should be addressed directly to the prospective employer. If you do not know his name, try to find out to whom the letter should be directed.

When closing your letter of inquiry, make a specific request for an interview preferably in person or, if this is not possible, by telephone. If the distance is too great, a self-addressed, stamped envelope may make it more convenient for the employer to get in touch with you.

Attach a small recent photograph of yourself to your letter. Preferably this should not be an informal snapshot unless it has been taken in your uniform.

2806 Parkway Drive
New Hope, Indiana
March 29, 1957

Miss Mary Carlson
Chief Physical Therapist
Michigan School for the Handicapped
Ann Arbor, Michigan

Dear Miss Carlson:

It has been brought to my attention by Miss Catherine James that there is an opening for a staff physical therapist in your department.

On June 12, I will complete the course in physical therapy at the University of Kiowana and this course is fully approved by the A. M. A. Council on Medical Education and Hospitals. Prior to this, I completed the B. S. degree at the University of Southern California with a major in biology.

During the required clinical practice as a physical therapy student, I have developed a very great interest in the treatment of cerebral palsy and would like to gain further experience in this challenging area of physical therapy. It is my understanding that I could acquire valuable experience in this area in your department as well as broad experience in treatment of all pediatric disabilities.

I am 24 years of age, single and in excellent health. During my undergraduate education and throughout my physical therapy training I maintained a high academic rating, always in the upper one-third of the class. I have been a student member of the A.P.T.A. for the past year and have participated in chapter meetings and activities. For personal and professional references you may wish to contact:

Miss Arlys Whitney, Supervisor
Department of Physical Therapy
Redwood County Hospital
Redwood, California

Miss Dorothy Hartley, Director
Curriculum in Physical Therapy
Children's Hospital
Phoenix, Arizona

Rev. Allan H. Ellis
1297 San Juan Avenue
Festernville, Indiana

I will be in Ann Arbor during the week of June 19-26 and will take the liberty of telephoning your secretary at 10:00 on Monday, June 19, in the hope that an appointment may be arranged for sometime during the week.

I look forward to the pleasure of meeting you.

Sincerely yours,
Sarah Ann Hall
(Miss) Sarah Ann Hall

The appearance of your letter of application is often the deciding factor between consideration and the waste basket. An untidy, hard-to-read, poorly written letter does not deserve consideration. The following lists may serve as guide-posts for the appearance of your letter:

DO

Typewrite or write legibly
Select white business-size paper
Use a paper which travels well (not onion skin)
Set letter "nicely" and evenly on page
Use straight, reasonably wide margins
Number pages

215 Monroe Street
Clarksville, Ohio
April 1, 1957

Mr. Arthur Jonas
Administrator
Boston General Hospital
Boston, Massachusetts

Dear Mr. Jonas:

The PHYSICAL THERAPY REVIEW for March, 1957, carried an announcement of an opening for a staff physical therapist in your hospital. I would like to be considered for this postion.

I will be graduated from Children's Hospital (Phoenix) with a certificate in physical therapy on June 6, 1957. I am most interested in obtaining a staff position in a teaching hospital located on the eastern seaboard. Since I shall have had no experience in physical therapy beyond that required in clinical practice as a student, I am especially desirous of working under the supervision of a qualified physical therapist. I am also interested in the opportunities offered by the in-service training program conducted by your senior physical therapy staff.

My curriculum vitae is attached. If my qualifications meet the requirements of the position, I would appreciate an interview at your earliest convenience. I have enclosed a self-addressed postal card in order for you to arrange the day and time of the interview.

If an interview cannot be arranged, I would appreciate receiving any information about the physical therapy department, including personnel policies, and the name of my immediate supervisor, should you be interested in my application.

Thank you very much for your consideration.

Yours very truly,

James C. Walsh

James C. Walsh

enc.2

DON'T

Scrawl or scribble
Use colored inks
Use colored or perfumed paper
Use ruled paper
Odd sized or folded stationery
Use postal cards
Erase, cross out, or leave finger prints on paper
Send a wrinkled letter

Remember there is *never* any excuse for sending a letter which contains misspellings, grammatical errors, or poor punctuation. The surest way to insure your *not* getting a position is to spell a few words incorrectly, use a word in the wrong connotation, or use long, never-ending sentences. Another inexcusable error is to typewrite your name without countersigning it in ink. Never mail a letter which will discredit you by its appearance.

Curriculum Vitae

It is quite common practice when writing letters of application to prepare a curriculum vitae. The curriculum vitae is a brief outline setting forth one's pertinent personal history, education, experience, and special qualifications. It serves to give the employer a capsule introduction to the applicant without being distracted by narrative and individual interpretations. If a curriculum vitae is attached to a letter of application, the letter itself may be used as the means for stating reasons for interest in the job, source of knowledge and your personal aims in requesting consideration for employment.

Your letter of application is your first contact with an employer; it is an interview on paper. If you have something to offer, and every good physical therapist does, it is up to you, and to

CURRICULUM VITAE

Name: James Charles Walsh — Sex: Male

Address: 215 Monroe Street, Clarkville, Ohio — Date of Birth: February 19, 1930 (Harrisburg, Pa.)

Telephone: Clark 3-4850

Marital Status: Married. Two children ages 4 and 1

Health: Excellent. Wear corrective glasses. No other physical defects.

Education:	Dates	Degree	Remarks
Jefferson High School, Clarkville, Ohio	1942-1946	Diploma	
Centralia College, Nederva, Ohio	September 1946, June 1950	B. A. cum laude	Biology
Children's Hospital, Phoenix, Arizona	June 1956, June 1957	Certificate	Expected June 1957

Experience:

City High School, Oakdale, Ohio	September 1950, June 1953	Biology Teacher	Superintendent Mr. David J. Ellis
U. S. Army	July 1953, May 1956	Staff Sergeant, Physical Therapy Corpsman	

Clinical affiliations as student in physical therapy, April - June 1957:

Union County Hospital (Phoenix), 4 weeks . . . . . .General physical therapy
City Cerebral Palsy Center (Albuquerque), 2 weeks. . .Cerebral palsy
Harrington Rehabilitation Center (Tucson), 4 weeks . .General physical therapy
Fremont Veterans Hospital (Tucson), 2 weeks . . . . .Neurologic-Orthopedic

Publications:

First Impressions on Clinical Practice. James C. Walsh and Martha Brown, PHYSICAL THERAPY REVIEW, 37: 126-127, January 1957

Professional Organizations:

American Physical Therapy Association
American Association for the Advancement of Science

Nonprofessional or Social Organizations: Sigma Nu

Honors and Awards: B.A. degree cum laude; Phi Beta Kappa; President, Senior Class, Centralia College, 1950

References:

Miss Janet K. Rueson, Chief Physical Therapist, Union County Hospital, Phoenix, Arizona	Rev. John M. Parry, 347 Oak Street, Clarkville, Ohio	Miss Wilma B. Gantzen, Associate Professor and Director, Curriculum in Physical Therapy, Children's Hospital, Phoenix, Arizona

you alone, to sell yourself. When you prepare your first letter, it would be to your advantage to have one of your faculty advisors read and criticize it before you mail it.

The letters and curriculum vital are presented as guides which you might like to follow, but each letter should contain your own personal touch. Use your own ideas to express your own personality.

The information on letters of application was collected by Audrey Haugaard, Student Editor, and was prepared for publication by Helen Hislop, Assistant Editor of the Review Editorial Board.

Physical Therapy Programs

APPROVED BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

Schools offering the four year program leading to a baccalaureate degree accept high school graduates and transfer students. Schools offering the 12 to 16 months' program leading to a certificate accept students who have completed all or most of their undergraduate work providing they meet certain course requirements. Recipients of a degree and/or certificate have equal professional status. For specific information regarding each school's entrance requirements, tuition, and other fees, write to the physical therapy director indicated below. All students should investigate course requirements *early*.

	Degree	*Certificate*
CALIFORNIA		
Mary J. Dodge School of Physical Therapy Childrens Hospital Society 4614 Sunset Boulevard Los Angeles 27	‡	†
Ronald A. Hershey School of Physical Therapy College of Medical Evangelists 312 N. Boyle Avenue Los Angeles 33	†	†
Lucille Daniels Division of Physical Therapy Stanford University Stanford (Palo Alto)	†	†
Margery L. Wagner Curriculum in Physical Therapy University of California The Medical Center San Francisco 22	†	†
Charlotte W. Anderson Department of Physical Therapy University of Southern California University Park Los Angeles 7	†	†
COLORADO		
Dorothy Hoag Curriculum in Physical Therapy University of Colorado Medical School Denver 20	†	†
CONNECTICUT		
Frances Tappan School of Physical Therapy U 101 University of Connecticut Storrs	†	
ILLINOIS		
Elizabeth C. Wood Course in Physical Therapy Northwestern University Medical School 303 East Chicago Avenue Chicago 11	†	†
IOWA		
Olive C. Farr Physical Therapy State University of Iowa Hospitals Iowa City		†
KANSAS		
Ruth G. Monteith Section of Physical Therapy University of Kansas Medical Center Kansas City 12	†	†
LOUISIANA		
Isadore Brown, Acting School of Physical Therapy Charity Hospital of Louisiana New Orleans 12		†
MASSACHUSETTS		
Adelaide L. McGarrett Physical Therapy Department Boston University Sargent College 6 Everett Street Cambridge 38	†	†
Constance K. Greene Department of Physical Therapy *Bouve-Boston School, Tufts University Medford 55	†	
Shirley M. Cogland *Program in Physical Therapy Simmons College-Children's Hospital 300 Longwood Avenue Boston 15	†	†
MICHIGAN		
Virginia Wilson Curriculum in Physical Therapy University of Michigan University Hospital Ann Arbor	†	†
MINNESOTA		
Darrell D. Hunt School of Physical Therapy Mayo Clinic Rochester		†
Ruby M. Overmann Course in Physical Therapy University of Minnesota 860 Mayo Memorial Hospital Minneapolis 14	†	

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

	Degree	Certificate
MISSOURI		
Sr. M. Imelda, S.S.M. Department of Physical Therapy St. Louis University 1325 South Grand Boulevard St. Louis 4	†	
Beatrice F. Schulz Department of Physical Therapy Washington University School of Medicine 660 So. Kingshighway St. Louis 10	†	
NEW YORK		
Dorothy L. McLaughlin *School of Physical Therapy Albany Hospital-Russell Sage College New Scotland Avenue Albany 8	†	†
Mary E. Callahan Courses for Physical Therapists Columbia University College of Physicians & Surgeons 630 West 168th Street New York 32	†	†
Elizabeth C. Addoms Physical Therapy Curriculum School of Education, New York University Washington Square East New York 3	†	†
Mildred F. Heap Program in Physical Therapy University of Buffalo 2183 Main Street Buffalo 14	†	†
NORTH CAROLINA		
Helen Kaiser Division of Physical Therapy Box 3403, Duke Hospital Durham		†
OHIO		
Robert D. Kruse Course in Physical Therapy Frank E. Bunts Educational Institute 2020 East 93rd Street Cleveland 6		†
Gladys G. Woods School of Physical Therapy Ohio State University University Hospital Columbus	†	†
OKLAHOMA		
Thelma Pedersen School of Physical Therapy University of Oklahoma, Medical Center Oklahoma City 4	†	†
PENNSYLVANIA		
Dorothy E. Baethke Division of Physical Therapy University of Pennsylvania 205 S. 34th Street Philadelphia 4	†	†
Kathryn Kelley Curriculum in Physical Therapy D. T. Watson School of Physiatrics Leetsdale	‡	†
PUERTO RICO		
(All classes given in Spanish) Lutgarda Vega School of Physical & Occupational Therapy Professional Bldg., 8th Floor Stop 22, Santurce		†
TEXAS		
Doris E. Porter Grady Vaughn School of Physical Therapy Baylor University Hospital Dallas 1	†	†
Cecelia J. Lee School of Physical Therapy Hermann Hospital Houston 25	‡	†
Ruby Decker School of Physical Therapy The University of Texas Medical Branch Galveston	†	†
VIRGINIA		
Susanne Hirt School of Physical Therapy Medical College of Virginia Richmond 19	†	
WISCONSIN		
Beth J. Phillips Curriculum in Physical Therapy Marquette University School of Medicine 561 North 15th Street Milwaukee 3	†	
Margaret Kohli Course in Physical Therapy University of Wisconsin Madison 6	†	†
U. S. ARMY MEDICAL SERVICE		
*Physical Therapy Course Army Medical Service School Brooke Army Medical Center Fort Sam Houston, Texas Write to: The Surgeon General Department of the Army Washington 25, D. C. Att.: Personnel Division		†

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

Please direct all inquiries regarding tuition, entrance requirements and other specific information to the school and *not* to the American Physical Therapy Association.

Abstracts

Physical Therapy in Thoracic Surgery

Gladys M. Storey (St. Thomas' Hospital, London), PHYSIOTHERAPY, 42: 265-269, October 1956

Fundamental to good therapy for all thoracic surgery patients is the consideration of each as an individual. Basically the duties of the physical therapist are three-fold: to prepare the patient for the operation both physically and mentally, to make some contributions towards the information required to form the diagnosis, to help restore the patient to normal with all possible speed after operation.

In the preoperative period the physical therapist should take time to explain postoperative routine to the patient. He should also be instructed in the means that will be used to obtain optimum mobility and function of the arm, thorax, and muscles involved in the incision. The therapist will generally evolve his own technic for teaching relaxation and breathing exercises. Other duties in this period include taking estimates of vital capacity and maximum breathing capacity, and giving exercise tolerance tests.

Physical therapy in the postoperative period should be started about one hour after the patient's return from the operating room and continued at intervals thereafter. As a result of anesthesia and handling of the lung during thoracotomy, the accumulation of bronchial secretions may be a problem. Breathing exercises concentrating on expiration are a great help in assisting to move these secretions from the periphery of the lung to the area of the cough reflex.

The physical therapy routine may be divided into three parts:

1. The maintenance of correct posture. The most common deformity likely to occur after lateral thoracotomy is a scoliosis with the concavity on the side of the incision generally produced by prolonged sitting in a poor position in bed. The deformity which may occur after thoracoplasty is more complex. Because of the removal of the first two ribs and the resulting muscle imbalance, the scoliosis produced has its convexity towards the thorocoplasty side. The author presents many helpful suggestions for overcoming these difficulties.
2. The increase of respiratory efficiency and encouragement of coughing and expectoration. The act of coughing is painful and frightening and the patient will need a great deal of encouragement to obtain a cough which is effective in removing secretions. Expiratory breathing exercises are very valuable. Expansion exercises are also given to all relevant areas. Suggestions for aiding the patient to increase his coughing effectiveness are presented.
3. The maintenance of mobility and the restoration of the functions of all parts of the body. Full range of motion should be obtained as soon as possible. Immediately after operation movement of the lower extremities should be encouraged to reduce the risk of thrombosis.

The type of operation performed and the patient's reaction to it, as well as the original disease, may cause the course of the postoperative program to be varied considerably from one person to another. It is important for the physical therapist to ensure that these patients realize the importance of the steady progression of their activities not only while in the hospital but after discharge.

Physical Medicine and Rehabilitation

Arthur L. Watkins (Massachusetts General Hospital, Boston, Mass.), New England J. Med., 255: 1233-1239, Dec. 27, 1956

This article comes under the section of "Medical Progress." Dr. Watkins discusses the current trends in physical medicine and includes an excellent, though not conclusive, review of the current literature. The paper is divided into three main sections: electrodiagnosis, biophysical aspects of physical medicine, and clinical applications in physical medicine.

The present electrodiagnostic tests are of most value in determining the presence or absence of lower motor neuron disease or injury. Determination of rheobase, chronaxie, and strength-duration curves remain the fundamental methods of measuring lower motor neuron function. The reference to faradic response is now archaic. Utilization of electromyography has come to the fore but there are still no generally accepted standards of technic of recording as in electrocardiography.

Radiation, diathermy, ultrasound, mechanical aids, and exercise physiology and technics are discussed under biophysical aspects. References are made to various studies and the most recent literature in each of these fields. It is mentioned that the emphasis has tended to shift from the development of the application of various powerful physical agents to studies of exercise physiology and improvement in therapeutic exercise technics. The more conservative approach to muscle reeducation and the newer methods of proprioceptive facilitation are both described. So far, critical comparison of these two methods has been difficult. However, it is the opinion of the author that a new important advance has been made in neuromuscular reeducation.

In clinical practice the team approach, including physician, therapist, social worker, vocational counsellor, and selected consultants, has been emphasized. The treatment of the hemiplegic patient, the patient with rheumatoid arthritis, the paraplegic patient, and the amputee are discussed in relation to total rehabilitation. The recent medical literature on the subject of poliomyelitis has, of course, dealt largely with the vaccines for the prevention of the disease. In spite of the development of a vaccine, much remains to be done for the permanently paralyzed patients. The importance of physical medicine to help rehabilitate the injured is of recognized value. Education of medical students, general practitioners, and specialists combined with research into the fundamental principles of rehabilitation, are needed for the future development of physical medicine.

What's New in Chiropractic?

Richard M. Stalvey, NEW YORK STATE J. MED., 57: 49-59, January 1957

This article is a discussion of the evolution that has been going on in the chiropractic field. Most of the evidence of change has been taken directly from chiropractic literature and pronouncements. It can be shown that despite the new dress, chiropractic, when viewed in the light of accepted medical practice, is still what it always has been—pure and simple cultism.

The philosophy of chiropractic was first propounded in 1895 by an

Iowan named Palmer who cracked the back of a deaf janitor. The deaf man immediately regained his hearing and chiropractic was born. Palmer subsequently established schools where chiropractors were "graduated" following a course of only a few months duration. Schools of the same nature flourished thereafter, the theory of chiropractic being that the cause of disease, or "disease," was found in the abnormal alteration of the nerve force which could be corrected by spinal adjustments.

The chiropractors now have a new theory of chiropractic, set forth in the pamphlet, "Educational Standards for Chiropractic Schools," dated 1955 and including these statements: "The chiropractor is fully aware of the importance of heredity, nutritional deficiencies, the environmental factors of bacterial and virus invasion, fatigue, trauma, psychic disorders, and occupational hazards. He is also aware that conditions of irreversible pathology may require surgery or palliative measures."

A great deal of attention is given to the subject of chiropractic education. NCA leaders realize their vulnerability on this count and are trying to bring respectability to chiropractic education. Approved schools must teach a course consisting of 4,000 to 5,000 hours in not less than four graded courses of nine months each. At the present time there are eight NCA-approved schools with about four more seeking approval. Chiropractic standards provide that applicants for admission must show evidence of high school education. The next step will be to require two years' pre-chiropractic college work and ultimately a bachelor's degree for admission. The chiropractic standards call for courses in anatomy, embryology, histology, physiology, biochemistry, bacteriology, pathology, public health and sanitation, obstetrics and gynecology, and the practice of chiropraxis. The latter takes up 49 percent of the curriculum. There are no chiropractic training hospitals. A review of current catalogs of some of the chiropractic colleges shows that their faculty standards are still far below those of other professional schools. Chiropractic education still includes teaching "iris diagnosis" and "zone therapy," subjects which have been thoroughly discredited.

Chiropractors are licensed in 44 states, Alaska, Hawaii, Puerto Rico, and in several Canadian provinces. The main emphasis now is on securing licensure in those states that do not license chiropractors, New York being the prime target. The NCA would like to see a four-year course as a requirement.

Chiropractors are attempting to enter the field of medicine. They feel they can bring this about legally by raising their educational standards and by increasing the scope of chiropractic licensure acts. But even if their schools should achieve the approved label it would not change the real state of affairs. From the evidence available the schools are wholly inadequate and incapable of preparing students for the practice of medicine. You cannot create a physician by legislation.

Early Ambulation and Psychotherapy for Treatment of Closed Head Injury

Ragnar Mullar and Bengt Naumann (Stockholm, Sweden), ARCH. NEUROL. & PSYCHIAT., 76: 597-607, December 1956

This is a study of 258 closed head injuries and the relationship of pretraumatic personality, emotional reaction to the accident, and environmental factors to the postconcussion syndrome (the persistent symptoms following head injury).

Of the 258 patients, 143 had no abnormal pretraumatic mental state. The others ranged from mental defectives and psychotic personalities to alcoholism and neurotic disturbances. One out of every 5 patients declared mental stress at the time of the accident. The occurrence of neurological signs, duration of bed rest and hospitalization, duration of disability and craniocerebral symptoms increased as the duration of post-traumatic amnesia increased. The duration of post-traumatic amnesia determined the prognosis of the patient, not age as would be supposed.

The patients were put on 24 hour bedrest, after which they were allowed freedom of movement. When lucid, psychotherapy was instituted, and when free of headache and dizziness, freedom of the ward was allowed. Psychotherapy consisted of daily talks in the ward and was of a supportive nature. Ambulation was not contraindicated and was used as a psychological aid to relieve the patient's mind about having a serious disorder and being incapacitated by it.

Results show that 237 of the patients were able to return to their former jobs and 79 per cent required only four weeks disability. Only 17 per cent of the cases needed short-term psychoanalysis over and above the psychotherapy given in the hospital. Most of the patients requiring this showed histories of mental disorders prior to the accident. These figures, as compared with those collected by previous investigators, show a decrease in duration of hospitalization and disability and also a decrease in postconcussion symptoms.

The Scalenus Anticus Syndrome

Averill Stowell (Tulsa, Oklahoma), J. Internat. Coll. Surgeons, 26: 711-717, December 1956

There has been a great deal of controversy about the role of the scalenus anticus muscle in the production of pain in the neck, shoulder and arm. In this article the author describes the scalenus anticus syndrome, the mechanical factors involved in the syndrome, examination, treatment, and results of treatment.

Two divisions of the syndrome may be defined. With the first, the symptoms come on for no apparent reason in the prime of life and may be called the "primary" scalenus syndrome. With the second, the symptoms follow trauma to the neck, chest, or shoulder and may be called the "secondary" (post-traumatic) scalenus syndrome. This second type is especially common after whiplash injuries of the neck.

The pain is usually dull, aching, and diffuse, but may be localized along the medial surface of the elbow and hand and in the occipital area or below the scapula. The numbness is most often noted when the patient is lying down or when the arm is outstretched as in typing. It is usually referred to the ring and little finger areas. Weakness or loss of grip and atrophy of the intrinsic muscles of the hand are minimal. However, atrophy of the biceps, deltoid, and supraspinatus muscles has been noted in a small percentage of cases. On examination the diminution or absence of the triceps reflex on the affected side is the most common neurologic sign, and hypesthesia of the ulnar area of the hand is relatively common. The most important single sign is the ability of the examiner to reproduce the pain by pressure in the supraclavicular or scalene triangle.

The factors involved in the pro-

duction of the pain, numbness, and weakness are essentially mechanical. Increased scalenus pressure is exerted on the cervical nerve roots. After a whiplash, in particular, the head is held as nearly immobile as possible to prevent pain, and over a period of days the scalenus muscle tightens. A reflex arc then becomes established, resulting in pain and numbness. A similar mechanical factor can be suggested in typists, hairdressers, and telephone switchboard operators whose arms are held in an outstretched position for long periods of time. In many cases no suitable explanation can be found.

Medical and surgical treatment is described in detail. It is emphasized that adequate muscle resection is necessary for a satisfactory result. It is suggested that exercise be started 72 hours after surgery.

Experience with Transplantation Operations in Loss of Opposition of the Thumb

C. L. Jeannopoulos (New York State Rehabilitation Hospital, West Haverstraw, New York), NEW YORK STATE J. MED., 56: 3655-3663, Dec. 1, 1956

Opponens transplant is a term commonly employed for transplantation operations in loss of thumb opposition. This term is both misleading and inaccurate. The abductor brevis, especially when aided by the flexor brevis and the abductor longus, can oppose the thumb very effectively, even when there is complete paralysis of the opponens pollicis. This fact is demonstrated in patients with poliomyelitis when the opponens pollicis is selectively involved. Also, in surgery the direction of pull as well as the attachment of the transferred tendon to the thumb, simulates the combined action of the thenar muscles, least of all that of the opponens pollicis. Duchenne (1867) demonstrated that the abductor brevis is the most important muscle of the thenar group, as it can perform all the essentials of opposition.

The purpose of this paper is to discuss some of the more important considerations in the surgical management for loss of opposition in poliomyelitis. The superficial flexor of the ring or of the middle finger was employed as a motor to the thumb in most of the cases in this report. This muscle was selected as the motor of choice for several reasons. It may be more readily spared without affecting the muscle balance of the hand and without any appreciable impairment of function of the donor finger. Reeducation is greatly simplified. This is particularly significant in younger children. The methods of Thompson and Bunnell are described and the merits of each discussed.

Postoperative care consists of immobilization of the wrist in 30 degrees of flexion with the thumb in maximum pronation and abduction opposite the middle finger. Two weeks after surgery a removable, molded plaster of paris "opponens cuff" is applied, and muscle reeducation is begun. A week later the patient is started on gentle, resistive exercises which are gradually increased in intensity. The opponens splint is worn for at least six weeks postoperatively. In patients who depend on crutches for ambulation, gait training should not be resumed for 8 to 10 weeks following surgery, and then only with the thumb well protected.

It is important to differentiate between thumb opposition and functional opposition. The latter is dependent on the over-all strength of the hand and not solely by the ability of the thumb to oppose effectively to the little finger. Cases are presented to illustrate varying degrees of hand disability and some of the operative procedures, other than tendon transference to the thumb, which are often necessary to restore functional opposition.

Conservative Therapy in Peripheral Nerve Dysfunction

Keith C. Keeler (Akron, Ohio), J.A.M.A., 162: 1596-1599, Dec. 29, 1956

The management of a peripheral nerve injury consists in providing the most favorable conditions for return of function. Attention should be paid to keeping the muscles and joints in condition by all types of physical therapy so that when the nerve does regenerate, the affected mechanism can work. Management must be based on pathophysiological conditions. Some of these conditions are discussed in this paper. They include electrodiagnostic studies, chemical studies, microscopic studies, effects of trauma to the nerve, studies on nerve repair, and the effects of electrical stimulation.

The aims of physical therapy are to (1) stimulate the contractile elements of muscle during denervation, (2) retain extensibility of fibrous tissues surrounding each muscle fiber and fasciculus of fibers, (3) maintain elasticity of the capsule about affected joint, (4) promote increased blood supply, and (5) provide functional alinement and partial usage of the affected part during the denervation and recovery period. The application of specific technics of conservative therapy for neuropathy of the facial nerve and for involvement of the nerve in an extremity is discussed. Physical therapy for the facial nerve includes the application of heat, care of the eye and mouth, splinting, electrical stimulation, and exercise. Physical therapy for peripheral nerve dysfunction in an extremity includes passive motion, dynamic bracing, electrical stimulation, and assistive exercise, gradually increasing to resistive exercise. The advantages of dynamic splinting over static splinting are listed. It is emphasized that maximum contractile response should be obtained in electrical stimulation. The electromyograph may be used to help the patient exercise those fibers that will voluntarily respond. Exercises are continued until optimum strength and coordination are obtained, depending upon the requirements of the involved parts in relation to the patient's employment.

Experiences with Poliomyelitic Scoliosis After Fusion and Correction

Thomas Gucker (Warm Springs Foundation, Warm Springs, Ga.), J. BONE & JOINT SURG., 38-A: 1281-1300, December 1956

In a series of 78 patients with poliomyelitic scoliosis treated by spine fusion, the final results were as follows: 9 per cent became worse; 47 per cent showed no change; and 44 per cent were improved. The average follow-up period in this series was four and one-twelfth years.

In 44 patients (56 per cent) there appeared to be a pseudarthrosis. Only 14 per cent of these patients had pain, however, and only 18 per cent were reoperated upon. About 45 per cent of the defects remained visible roentgenographically for as long as 10 years.

In all patients the greatest loss of initial correction occurred at least six months after sitting and standing was resumed, and in most patients it occurred after a year.

It is recommended that in the treatment of patients with paralytic

scoliosis, iliac or thin tibial grafts be used, that four months of recumbent immobilization be considered sufficient, and that the patient wear a rigid cellulose-acetate jacket for at least two years after the upright position is permitted.

Physical Measures in the Aged

D. L. Rose, E. B. Shires, and W. S. Alyea (Department of Physical Medicine, University of Kansas Medical center), J.A.M.A., 162: 1524-1526, Dec. 22, 1956

The purposes of this paper are to call attention to the disturbances in bodily functions produced by hypoxia; to demonstrate the need for improving the efficiency of external respiration when disturbances exist; and to emphasize the necessity for early attempts at ambulation.

It has long been known that there is a reduction in vital capacity in the older person. While vital capacity is not a valid criterion for the degree of efficiency of pulmonary function under all conditions, such measurements do provide a means for observing the progress of a patient over a period of time as well as for comparison of the patient's capacity with normal values. The results of studies made at the University of Kansas Medical Center indicate that normal vital capacity occurs very seldom in the ill older person. None of the patients tested had a vital capacity of more than 70 per cent of the predicted normal; the majority had capacities below 50 per cent of normal. It would seem, therefore, that additional functional demands could only be met if there were a proportionate improvement in respiratory efficiency. Unless some improvement could be achieved, the added functional demands of rehabilitation efforts might well contribute additional acute hypoxia to any chronic hypoxia already present.

Efforts to improve efficiency of respiratory function included the use of specific breathing exercises, intermittent positive-pressure breathing and an exsufflator to remove retained bronchial secretions. In nearly every patient this routine has resulted in increased exercise tolerance, less fatigue after exercise, and an improvement in general physical capabilities. An increase in approximately 1000 cc. in vital capacity has occurred in patients with the greatest diminution from normal.

Coupled with efforts to improve respiratory function have been attempts to help the patient achieve ambulation as soon as possible. Early use is made of the standing table, parallel bars, and light-weight splinting. The early achievement of ambulation by the elderly patient is regarded as more important than concentrated effort on reeducational exercises. The authors include a good reference list.

Changes in the Intra-Articular Temperature of the Knee with Cutaneous Vasoconstriction and Vasodilation of the Toes in Normal Subjects

Raymond Penneys and Nathan M. Smukler (Hospital of the University of Pennsylvania), ANN. RHEUMAT. DIS., 15: 241-245, September 1956

Previously reported by Hollander and Horvath were two sets of experiments, the first of which demonstrated an increase in intra-articular temperature of one knee when cold packs were applied to the contralateral knee and a decrease of temperature in one knee when hot packs were applied to the other. In another series of experiments, the immersion of one leg in water at 103° F. did not alter the temperature of the ankle joint of the opposite leg even though it produced cutaneous vasodilatation of the unimmersed foot.

The study presented in this paper is concerned with changes in joint temperature which accompany cutaneous vasoconstriction and vasodilatation in the extremities as elicited by body-cooling and body-warming. The 7 subjects used were healthy young adults 20 to 35 years of age. Skin surface temperatures were measured by thermocouples attached to the skin on the dorsal surface of the toes of both feet and to the anterior surface of each knee. A fine copper-constantan thermocouple threaded through a needle was projected into the joint space to measure intra-articular temperatures. Skin and intra-articular temperatures were recorded every 2 minutes by a Brown potentiometer.

Observations were made during a state of cutaneous vasoconstriction of the toes and then during a state of cutaneous vasodilatation. Cutaneous vasoconstriction was induced by exposure of the thinly clad, fasting subject to cool air in a constant-temperature cool room with air temperature of 21° C. Vasodilatation was accomplished by placing heating pads over the chest and abdomen and covering the subjects with blankets so that only the face, knees, and feet were exposed to the air.

The experiments show that with body-cooling and body-warming no fixed relationship exists between the temperature of the knee joint and the temperature of the skin of the toes in the same extremity. With body-warming, the intra-articular changes were much better correlated with the temperature changes of the skin of the knee. Whenever the joint temperature increased with body-warming the skin temperature also increased, and whenever the joint temperature failed to increase with body-warming, the skin temperature also remained unchanged.

The response of the joint temperature to the application of cold or heat to another part of the body depends apparently on the intensity, location, and duration of the temperature stimulus, since body-cooling and body-warming affect the temperature of a knee joint differently from the cold packs and hot packs applied to the contralateral knee by Hollander and Horvath. It is speculated that the changes in joint temperature in body-warming and body-cooling in these experiments are due to blood flow to the joint, just as changes in skin temperature are due to changes in blood flow to the skin. The relatively high values of the joint temperature which can be produced by body-warming is of therapeutic value if, and when, rapid blood flow to the joint is advantageous.

Acute Suppurative Arthritis

M. B. Watkins, R. L. Samilson and D. M. Winters (Dept. Orthopedics, Columbia Presbyterian Medical Center, New York), J. BONE & JOINT SURG., 38-A: 1313-1319, December 1956

Despite the widespread use of antibiotics in the prevention and control of general infection, the incidence of acute suppurative arthritis at a New York hospital has not changed significantly over a 20 year period. In a period from 1934 to 1955, 51 patients with acute joint infection, bacteriologically proved by joint aspiration and uncomplicated by osteomyelitis, were diagnosed. This series provided opportunity for a comparative evaluation of the results of treatment by aspiration and specific antibiotics and by incision

and drainage. Cases of gonococcal arthritis were excluded from the study.

Diagnosis in the early phase of this disease is often difficult. The usual clinical signs of marked muscle spasm with restriction of motion, increased local temperature, and severe systemic reaction may be masked if antibiotics are administered before joint aspiration X-ray examination may not detect any changes in the early phase of the disease.

Acute suppurative arthritis should be treated on an emergency basis, and the diagnosis should be established by joint aspiration or exploratory arthrotomy if necessary. All antibiotics should be withheld until aspiration has been performed. Often drainage of an infected joint is the treatment of choice, particularly in pyarthrosis of the hip.

Emotional Aspects of the Aged and the Aging

Martha Brunner-Orne, (New England Hospital, Boston, Massachusetts) J. AM. M. WOMEN'S A., 2: 392-394, November 1956

Personality characteristics associated with and found in the aged are not intrinsically caused by aging, but are in response to our cultural attitude. Though medical advances, coupled with improvement of living and working conditions, have increased the life span, the older person in our culture is increasingly ignored, neglected, and even discarded. These factors encourage the development of symptoms characteristic of psychopathologic senility.

To the aged and the aging the present may offer no challenge; there is a decrease in the feeling of usefulness, reduced self-esteem, progressive loss of self-confidence, and a profound sense of loneliness. Memory impairment, to some extent physiologic after 40, is increased by the lack of motivation for remembering current events; old memories may be more gratifying. When reality becomes less gratifying to the person, defenses and inhibitions break down and traits of suspicion, jealousy, self-centeredness, and hostility manifest themselves. Senility, aggressive passivity, and regression are often means of withdrawal and escape; defense reactions against an environment of overt and implicit rejection are occasionally disguised in attitudes of protection and over-protection.

In the past, pessimism has been the prevailing attitude on the part of the patient, doctor, and society. On the whole, however, it has been found that much can be accomplished and gained in restoring, revitalizing, and sustaining the emotional and physical condition of the aged person through psychotherapeutic effort and, in many, through well planned medication and electroshock therapy. The physician must be able to induce a positive attitude in the patient and his environment.

The Rocking Bed and Head Position

T. H. Joos, D. C. Dickinson, N. S. Talner, and J. L. Wilson (University of Michigan Poliomyelitis Respirator Center, Ann Arbor, Michigan), New England J. Med., 255: 1089-1090, Dec. 6, 1956

It was found that a patient returning for a periodic checkup could no longer get enough exchange of air when using the rocking bed. It had been assumed that for maximal effect the head must come below the horizontal position when rocking. The patient's head was elevated to 15° in an effort to help her continue to use the rocking bed as an aid. Her tidal air then was found to be greater than with her head in the supine position. The difference enabled her to use the rocking bed successfully. The same phenomenon was also observed in another patient. These 2 patients stimulated the authors to do random checks on the rocking-bed ventilation patterns of 9 other respirator patients with chronic poliomyelitis.

The ventilation patterns were recorded while the patients were using an Emerson rocking bed set so that the head portion of the bed passes through an arc of 37°. The records were made with the head of the bed in three different positions: supine, entire upper part of bed set at 15°, then 30°. The head moved down to 10° below the horizontal in the first position, down to 5° above the horizontal in the second position, and only down to 20° above the horizontal in the third position. The rates of oscillation varied between 18 and 20 times per minute. The position of the legs was always flat. Each patient was observed carefully for muscle assistance to breathing during rocking, and none could be observed.

The results show that of the 11 patients who were measured, 8 had tidal air exchanges, with the upper part of the bed elevated to 15°, that were superior to those obtained when their heads were supine. When the upper part of the bed was elevated to 30°, 7 patients had greater tidal air changes than those recorded in the supine position.

These results are not what one would expect, since the principle of the rocking bed is dependent on movement of the abdominal viscera, with subsequent movement of the diaphragm. The following suggestions are offered in explanation. The compliance of the lungs, diaphragm, and rib cage certainly influences air exchange and the compliance is increased by the lessening of blood volume in the chest when in the sitting position. Also, it is believed that rocking with the head raised is more conducive to relaxation and perhaps helps increase air exchange.

Upper Extremity Amputation Surgery and Prosthetic Prescription

R. Mazet, C. L. Taylor and C. O. Bechtol (Prosthetic Laboratory, Dept. of Engineering, U.C.L.A., Los Angeles), J. BONE & JOINT SURG., 38-A: 1185-1197, December 1956

The Prosthetic Training Center at the University of California at Los Angeles has prescribed, manufactured, and field tested upper extremity prostheses for 240 patients. Nineteen of these had bilateral amputations. Eleven sites of amputation were studied.

Inasmuch as a number of persons with amputations in the so-called undesirable areas were successfully fitted with appliances, this group contends that the concept of "sites of election" in upper extremity amputations is obsolete. Amputation surgery of the upper extremity should be directed toward saving all possible length in all areas. Prosthetic considerations need not dictate the amputation site. Physical aspects, such as skin coverage, adequacy of circulation, good innervation, and function of the part to be saved, should be the determining factors in the decision as to the level of amputation.

Familiarity with the latest technics of prosthetic manufacture and fitting are as essential for the surgeon as his knowledge of surgical technics. Realization of the potentialities and limitations of recently

developed prosthetic appurtenances are necessary for the prescription of the appliance best suited to the needs of the individual. Functional prosthetic replacements are available for almost all types of upper extremity amputations and are presented in concise chart form in this paper. Prescription of the prosthesis which is best suited to the patient is a privilege of the surgeon which cannot be delegated.

The surgeon should share the responsibility for amputee rehabilitation with the other members of the prosthetic team: patient, therapists, trainer, prosthetist, vocational counselor, and psychologist. His responsibility to the patient does not terminate with the healing of the wound but must continue through the period of rehabilitation.

This paper presents brief discussions of amputations at various sites in the upper extremity, and the type of prosthesis most amenable to each. There are numerous case reports which illustrate prosthetic problems.

Hearing and Speech in Infantile Hemiplegia Before and After Left Hemispherectomy

R. C. Goldstein, A. C. Goodman and R. B. King (Washington University School of Medicine, St. Louis, Missouri), NEUROLOGY, 6: 869-875, December 1956

Quantitative findings on hearing and a discussion of the speech of 4 patients with infantile hemiplegia before and after hemispherectomy are presented.

Preoperative testing showed normal threshold in both ears for pure tones as well as for speech, but the ability to identify difficult words above threshold intensity was below normal. Approximately 45 per cent of the words presented to the ear contralateral to the pathologic hemisphere were identified erroneously, as compared with a 20 per cent error on the other side. Audiometric records following hemispherectomy did not differ markedly from preoperative records.

Formal tests, which might have revealed disturbances of language, were not given; however, vocabulary and language appeared to be commensurate with apparent intellectual ability and level of education. No aphasia was noted but there was some lack of control of loudness and tempo. Following surgery, improvement in modulation was observed in 3 patients. Speech did not appear to be affected adversely by the surgical procedure.

Principles of Primary Care of the Injured Hand

Joseph H. Boyes, TEXAS STATE J. MED., 52: 845-849, December 1956

The first and most essential feature in the primary treatment of the injured hand is protection of the wound. First-aid dressings and compression bandage are necessary, while indiscriminate cleansing and probing are dangerous unless operating room conditions are used.

The second step is the primary repair of the wound, to give permanent closure as a definitive surgical procedure rather than a first-aid measure.

The third consideration given the injured hand is protection for later function. In some cases all three stages may be accomplished simultaneously. The extent of injury, the site of wounding, the facilities available, and the contamination present, are factors to help the physician decide whether or not the three stages may be combined. Tendon and nerve repair are secondary to wound closure; bone and joint repair are secondary to control of infection in functional position.

In summary, the principal aim of primary care is treatment of the wound. Only if this can be assured is the physician justified in attempting a more detailed repair of damaged underlying structures at the time of injury.

EDITOR'S NOTE—

"Physical Therapy in Thoracic Surgery," by Gladys M. Storey, abstracted in this issue, was read at the Second International Congress of the World Confederation for Physical Therapy and appears in the *Proceedings* of the Second Congress.

Book Reviews . . . . .

Muscle Testing: Techniques of Manual Examination. *By Lucille Daniels, M.A., Associate Professor and Director of Physical Therapy Department of Allied Medical Sciences, School of Medicine, Stanford University, Calif.; Marion Williams, Ph.D., Assistant Professor of Physical Therapy, Stanford University; and Catherine Worthingham, Ph.D., Director of Professional Education, the National Foundation for Infantile Paralysis.* Ed. 2. *Cloth; price $4.00. Pp. 176; illus. W. B. Saunders Co., Philadelphia, 1956.*

Our responsibility to keep pace with the changes and improvements particularly in our field is facilitated again with the excellent contribution by Daniels, Williams, and Worthingham in their revised edition of *Muscle Testing: Techniques of Manual Examination.* In a page by page comparison the changes are sufficient and significant enough to replace our first copy. And to others, particularly the physical therapy students, the book is invaluable — not only in learning muscle testing per se but also as a correlative manual in anatomy dissection, kinesiology and therapeutic exercise.

The format of the second edition is essentially like the first edition. The section on technics again is presented by range of motion diagrams, anatomical illustration, brief listings of factors limiting motion, fixation, the origin and insertion of each participating muscle, the procedure for testing each grade division, and sometimes, illustrations of "substitute" action. Though this may appear to be a complete approach, blank space is allowed, after each action analyzed, for the user's own variations in positioning, counter pressure, etc. This implies, and rightly so, that although the manual presents a basic approach in keeping with the latest findings there are still variables which further knowledge and experimentation will clarify, as well as those variables resulting from the pathology of the involvement. But even with the existing differences the manual affords an excellent background for all concerned with manual evaluation — the common, thoughtful use of which will insure better correlation between persons testing, and between the grade of the muscle tested and the functional activity of the patient. This is the purpose of the book and to this end it serves well.

The history, development of, and increasing importance of muscle testing is brought to date. The anatomical illustrations which were good in the first edition are surprisingly much better. Only in several places

was it difficult to compare the range of motion diagram with the anatomical illustration. This, because the anatomical illustration represents one side, and the range of motion diagram the other side. It was most interesting to compare the changes in the range of motion of the scapular muscles based on X-ray studies, and a study of which should help us in grading a too often difficult group. Changes in technic are evident throughout and most notable with the abdominal and back group — also difficult muscles to test. These changes follow the trend to position the part being tested emphasizing particular muscle action while minimizing the accessory action of others. Thus the muscle testing positions in some instances are more specific than previously. An entirely new section on facial muscles was included wisely, and follows the same concise approach.

It is nice to turn pages which do so easily, and to have at our fingertips the basic aids to our profession presented so clearly. It is commendable that the Muscle Testing Manual has been translated into several languages.

Clinical Studies in Neurology. *By Harry Lee Parker, M.S., M.D., F.R.C.P.I. Professor of Neurology, Mayo Foundation Graduate School, University of Minnesota; Senior Consultant, Section of Neurology, Mayo Clinic, Rochester, Minnesota. Cloth; price $6.50. Pp. 364. Charles C Thomas, Springfield, Ill., 1956.*

The modern medical textbook is usually a cold scientific presentation of the particular subject. Indeed, the average student finds most textbooks dull reading. Parker's *Clinical Studies in Neurology* is a different book. In a series of case presentations at the bedside, neurological syndromes are presented in a unique manner. Instead of the usual signs and symptoms, pathology and treatment, each syndrome is presented as an interesting and often delightful story in a manner which is both instructive and entertaining.

The more common neurological maladies are described clinically. While doing this, the author adds classical aphorisms and his own anecdotes and witticisms which are often gems of philosophy. Although such a book cannot take the place of a textbook of neurology, if it is read in conjunction with the standard texts, it will add zest to the student's long hours of study.

The graduate physician, also, will find this book worthy of his bookshelf, if not a companion to be kept near his desk and read from time to time as a pleasant interlude in his daily work.

Physical Measures in the Treatment of Poliomyelitis. *By Robert J. S. Reynolds, S.R.N., M.C.S.P., Superintendent Physiotherapist, Queen Mary's Hospital for Children, Carshalton, Surrey. Former Member of Council, Chartered Society of Physiotherapy. Cloth; price $2.50. Pp. 140; illus. Macmillan Co., New York, 1956.*

In this book the reader is presented with a scattered collection of ideas regarding the treatment of poliomyelitis. The subject is treated superficially, the material is inconclusive, and the technics are often questionable, with the result that there is complete failure to present a total rational program of physical therapy for the poliomyelitis patient.

Topics discussed include pathology and nature of the disease, the acute stage, the early convalescent stage, and the late convalescent stage. The most thoroughly covered is the subject of reeducation of the neuromuscular system and a detailed description of hot packing and bed positioning. All of the methods described are those advocated by Kenny, although methods from other references are cited.

Some sound principles, taken from stated references, are found throughout the book. There are also many questionable procedures described. The practice of working for a completely mobilized spine in a badly involved patient; inadequate technics for gait training; sitting and walking early without corset, braces, or crutches are examples.

The chapter on bracing is inadequate. No consideration is given upper extremity splinting except the brief mention of it as an aid to function.

The subject of function is not covered. There is a brief discussion of "gadgets" as assistance to the patient in attaining maximum independence in self care.

In the opinion of this reviewer there is no place for the chapter on reconstructive surgery in a book on physical therapy written by a physical therapist.

In summary, this work contributes nothing new or helpful to the person experienced in the treatment of poliomyelitis. For the physical therapist inexperienced in this area, no well organized scheme for a complete program of physical therapy is presented. On the contrary many debatable and possibly dangerous methods of treatment are described.

Basic Facts of General Chemistry. *By Stewart M. Brooks, Ph.G., B.S., M.S. Instructor in the Sciences, School of Nursing, Muhlenberg Hospital, Plainfield, N. J. Cloth; price $4.75. Pp. 354; illus. W. B. Saunders Co., Philadelphia, 1956.*

In the preface the author states that the book is commensurate with any academic program where a short course is offered or required. Since these courses usually have to do with the biological sciences, physiology in particular, most of the applications have been made in that line.

The author's wife read the book and whenever she had any trouble understanding the wording it was changed to make it more comprehensible. For this reason it is particularly good for review.

The book is well organized. There is an excellent glossary. The appendix contains the table of elements with their symbols, atomic numbers and weights, the common names of some of the important chemicals, and the general rules of solubility.

There are questions at the end of each chapter which help in review of the chapter. If one has already taken chemistry a good way to review is to read only the chapters where you cannot answer the questions.

Another thing that appeals about the book is its size. It is only 6 inches by 8¼ inches, which makes it very easy to handle.

Current Therapy 1956. *Edited by Howard F. Conn, M.D. and 12 Consulting Editors. Cloth; price $11.00. Pp. 632. W. B. Saunders, Philadelphia, 1956.*

With the remarkable advances in the treatment of disease during the past several decades, it is difficult for the practicing physician to keep informed of the new drugs and therapies that are being introduced. To assist him, Dr. Conn has edited a review of current methods of treatment, the present volume being the eighth edition of an annual series.

The volume is divided into 15 sections, each of which is concerned with a group of diseases. The disease categories considered are: infectious diseases, respiratory, cardiovascular, blood and spleen, digestive system, metabolism and nutrition, endocrine, urogenital, venereal, allergic, skin, nervous system, locomotor system, obstetric and gynecologic conditions, and diseases due to physical and chemical agents. There is a very helpful section containing a roster of drugs mentioned in the volume.

In each section, the treatment of specific diseases and conditions is discussed by an expert in the field. For example, in the section on diseases of the locomotor system, there are discussions of the treatment of rheumatoid arthritis, subdeltoid bursitis, fibrositis, and osteo-arthritis. In some instances, more than one method of therapy is presented for a specific disease. These represent different viewpoints of treatment or different concepts of the disease.

This volume will be of considerable value to the practicing physician and to students in the health fields, who require knowledge of present methods of treatment.

The reviews here published have been prepared by competent authorities and do not represent the opinions of the American Physical Therapy Association.

Our Book Reviewers for April

Mrs. Beryl B. Bilderback, inactive member of the American Physical Therapy Association; former Instructor, School of Auxiliary Medical Services, University of Pennsylvania; more recently, affiliated with the Wisconsin Neurological Foundation.

Herman Chor, M.D., Associate Professor, Nervous and Mental Diseases, Northwestern Medical School, Chicago.

Carmella Gonnella, Instructor, Physical Therapy, Medical Services Training Curriculum, Rehabilitation Clinic, University of Texas Medical Branch, Galveston.

Abraham M. Lilienfeld, M.D., Chief, Department of Statistics and Epidemiology, Roswell Park Memorial Institute, Buffalo.

Mary C. Singleton, Coordinator of Therapy, Georgia Warm Springs Foundation, Warm Springs.

World Health Day — April 7, 1957

Food and Health

The nations of the World Health Organization have chosen Food and Health as the theme for World Health Day for 1957. The relationship of food to health is of vital concern to the people of every country in the world.

Poverty is only one of the reasons people do not eat the right kind of food. Prosperity and ignorance also play significant roles. Even heart disease—a leading killer in an increasing number of countries—is now being attributed by some investigators to excessive consumption of unneeded fats.

Malnutrition undermines the health and saps the strength of hundreds of millions. In the Americas it is a leading cause of infant mortality. All too often young children die as a result of lack of protein and other essential elements of a balanced diet, although the immediate cause of death may be dysentery or some other disease against which undernourished bodies have little resistance.

Great advances have been made in the field of nutrition in recent years. We now possess sufficient basic knowledge regarding foods to explode many current and time-honored myths. Here in the Americas special attention should be directed to the Institute of Nutrition of Central America and Panama, familiarly known as INCAP. This institution is making history in an area where there is a high degree of undernourishment and malnutrition, especially among infants and children. INCAP is located in the City of Guatemala. Its members are the five Central American Republics and Panama. INCAP operates under the direction of a Council of Governments and the Pan American Sanitary Bureau, Regional Office of the World Health Organization. Its work is also supported by the W. K. Kellogg Foundation, and by other agencies and institutions. The results of the scientific studies carried out by INCAP in laboratory and field are being watched with keen interest by nutritionists throughout the world, as they contribute to the solution of major nutritional problems which are essentially similar in countless communities.

The changing of food habits of a people is a difficult, long-term task, but one that is often essential to the improvement of health. It requires the full collaboration of public health administrators and agriculturists.

The celebration of World Health Day in 1957 is sponsored jointly by the World Health Organization and the Food and Agriculture Organization. This is a natural partnership since nutrition is intimately related to the production of food.

A hungry, undernourished child cannot grow up into the fullness of adulthood; hungry or ill-fed men and women cannot contribute their share of work to their families or to society. Only an adequately nourished population can be a strong population, resistant to disease and able to carry on its daily activities efficiently, thus contributing to peace, stability, and security.

Message from Dr. Fred L. Soper, Director of the Pan American Sanitary Bureau, Regional Office of the World Health Organization.

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Doyle, Arch. Phys. Med. & Rehab., 37: 748-754, December 1956

Community Employment Project: An Intermediate Rehabilitation Program for Neuropsychiatric Patients. Delilah Riemer, Brit. J. Phys. Med., 19: 269-272, December 1956

Management of the Neurogenic Bladder. A. O. Posniak, Arch. Phys. Med. & Rehab., 37: 755-759, December 1956

Medical Care Services for Crippled Children in Illinois. Herbert R. Kobes, Brit. J. Phys. Med., 19: 265-269, December 1956

The Medical Management of Rheumatoid Arthritis. A. P. Hall and T. B. Bayles, Brit. J. Phys. Med., 19: 273-279, December 1956

RESPIRATION

Basic Oscillating Mechanism of Cheyne-Stokes Breathing. A. C. Guyton, J. W. Crowell and J. W. Moore, Am. J. Physiol., 187: 395-398, November 1956

Effect of Hyperventilation on Performance. B. Balke and J. P. Lillehei, J. Appl. Physiol., 9: 371-374, November 1956

Pulmonary Function Tests and Their Clinical Application. C. R. Woolf, Canad. M. A. J., 75: 1007-1015, Dec. 15, 1956

The Correlations between Vital Capacity and the P Wave of the Electrocardiogram. Desiderio Gross, Acta med. Scandinav., 156: 97-107, 1956

RESPIRATORY DISEASES

Acute Respiratory Diseases. J. M. Adams, Pediatrics, 19: 129-141, January 1957

Adenovirus Vaccine for Prevention of Acute Respiratory Illness. Part I. M. R. Hilleman, et al., J.A.M.A., 163: 4-8, Jan. 5, 1957. *Part II.* R. A. Stallones, et al., J.A.M.A., 163: 9-14, Jan. 5, 1957

Chronic Pulmonary Emphysema. L. Hyde and B. Hyde, Postgrad. Med., 20: 609-614, December 1956

Environmental Climatologic Therapy in Bronchial Asthma. S. D. Klatz and C. Beratein, Ann. Allergy, 14: 502-505, November-December 1956

Present-Day Management of Tuberculosis. Roger S. Mitchell, J. Chron. Dis., 4: 607-634, December 1956

Respiratory Function after Pneumonectomy. M. B. McIlroy and D. V. Bates, Thorax, 11: 303-311, December 1956

MISCELLANEOUS

Biological Effects of Atomic Radiation—Report to the Public. National Research Council, Indust. Med. & Surg., 25: 596-598, December 1956

Care of Casualties Caused by Nuclear Weapons. J. D. Goldstein and H. H. Werley, Am. J. Nursing, 56: 1576-1580, December 1956

Evaluation of Cortisone in the Treatment of Cerebral Infarction. Mark Dyken, J.A.M.A., 162: 1531-1533, Dec. 22, 1956

Lupus Erythematosus. Oswaldo G. Costa, Arch. Dermat., 75: 41-44, January 1957

Some Effects of High Altitude on Man. L. G. C. Pugh and M. P. Ward, Lancet, 271: 1115-1121, Dec. 1, 1956

Suprarenal Tumor (Cushing's Syndrome). M. G. Peterman, J. Pediat., 50: 59-65, January 1957

Special Report. The Second Congress of the World Confederation for Physical Therapy. Catherine Worthingham, Am. J. Phys. Med., 35: 345-352, December 1956

Special Report. The Second International Congress of Physical Medicine. Sidney Licht, Am. J. Phys. Med., 35: 331-344, December 1956

What's New . . . . . .

For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review.*

40. Versatile Sketching Pen

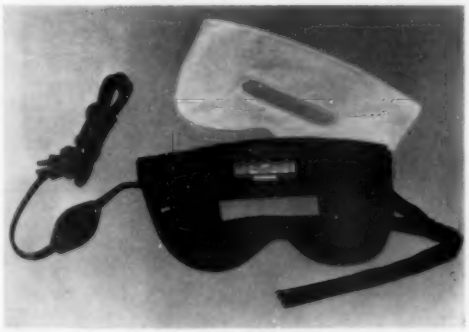
The Advanced Flo-Master Felt Tip Pen AD-22A set provides an extremely versatile sketching instrument. Handicapped patients will enjoy using this art medium since the only additional material required is paper. Sketching while in bed or a wheel chair becomes possible with a minimum of before and after work. The Flo-Master Pen should have great appeal to physical therapists who are interested in sketching as a hobby. Cushman and Denison Manufacturing Co.

41. Disposable Draping Sheet

So much like a cotton sheet this new disposable draping sheet is very soft, non-rattling and completely opaque.

Priced so that it costs no more than laundering a cotton sheet. It also saves the investment in an inventory of launderable sheets and insures against a lack of supply when need exceeds normal reserves. Size 40 x 48" individually folded. Samples are available from the Hospital Products Division of Robert Busse & Co.

42. Heat Mask



Winco Heat Mask, the manufacturer states, is designed to fit comfortably over the nasal and upper facial region; the window permits full vision during application. A 3 speed switch controls heat to low, medium or high. A dual thermostat safety control prevents overheating and the mask is approved by Underwriters' Laboratories. A washable inner mask is provided. Winco Affiliates, Inc.

43. Guide for the Sighted

Guide for the Sighted. Is it tactful to use expressions like "blind luck" or "I see," when talking to a blind person? Should you take a blind man's arm when you're helping him through traffic—or should you offer him yours? These are some of the questions discussed in a new pamphlet, *Guide for the Sighted in Contacts with the Blind* issued by the nonsectarian New York Guild for the Jewish Blind, 1880 Broadway, New York 23, N. Y. The Guide is distributed by the Guild as a public service and is available free on request.

Classified WANT-ADS

IMMEDIATE OPENING FOR STAFF PHYSICAL THERAPIST (male or female) to assist in well equipped and expanding physical therapy department. Excellent medical supervision. Good salary and liberal personnel policies. Contact Miss Jeanne Burkle, Personnel Director, Butterworth Hospital, Grand Rapids 3, Michigan.

Physical Therapist, STAFF POSITION, male or female. Salary commensurate with experience. Five-day week, liberal vacation, holiday and sick leave. Social Security. Apply Personnel Director, Crotched Mountain Rehabilitation Center for Children, Greenfield, N. H.

WANTED: Physical therapist, male or female, to work with cerebral palsy children. Congenial, relaxed atmosphere in new $85,000 air-conditioned building. One month's vacation plus school holidays, excellent salary, one hour from New York City. To begin as soon as possible. Please contact Edmund S. McLaughlin, Executive Director, Cerebral Palsy Center, 360 Norman Street, Bridgeport, Connecticut.

NEEDED: QUALIFIED physical therapist for staff position within agency or for home treatment program. Apply to Director, Curative Workshop, 615 N. Capitol, Lansing, Mich.

PHYSICAL THERAPIST: In Hospital-School for rehabilitation of children with orthopedic handicaps. Complete interesting program. Good salary, merit increases. Annual paid vacation, sick leave, excellent retirement plan. Write to Richard Eddy, Superintendent, Illinois Children's Hospital-School, 2551 N. Clark, Chicago 14, Illinois.

STAFF POSITION for California Registered Physical Therapist in Beach Front Rehabilitation Center. Salary based on experience. Periodic increments; 40-hour week. Liberal employee benefits including complete hospital and medical care. On the job training in applied proprioceptive neuromuscular facilitation techniques. Write Thomas Humphrey, Chief Physical Therapist, California Rehabilitation Center, 1 Pico Boulevard, Santa Monica, Calif.

PHYSICAL THERAPIST for 500-bed general hospital wanted for expanding program. Adult cases only. Social Security, good salary, paid vacation, 40-hour week. Inquire Akron General Hospital, Attention Miss Helen Meida, Akron, Ohio.

PENNSYLVANIA

Columbia Hospital located at Wilkinsburg, Pittsburgh 21, Pa., has openings for two physical therapists who are either registered by Pennsylvania or eligible registrants. The hospital is fully approved by the Joint Commission on Accreditation of Hospitals. Details concerning the openings may be obtained by writing Martha R. Speer, Superintendent.

WANTED: Physical therapist for children's convalescent home. Good salary and working conditions with annual increment. Five day, 35-hour week. Completely equipped department. For details write Superintendent, Betty Bacharach Home, Longport, N. J. (Atlantic City).

IOWA METHODIST HOSPITAL, DES MOINES, IOWA, needs registered physical therapist. Hospital has 400 beds, including 100-bed Raymond Blank Memorial Hospital for Children. Plans under way for construction of 120-bed chronic disease unit. Post-polio cases, in- and outpatient work. Competent professional staff and assistants, excellent working relationships. Apply A. D. Damiani, Personnel Director.

DEGREE PT for work in County Schools. Experience desired to help set up program. Must meet Michigan certification. State salary expected. Start now or September. Walter Wend, Director of Special Education, Monroe County Schools, Monroe, Michigan.

QUALIFIED THERAPIST for outpatient rehabilitation center. Salary commensurate with experience. Contact Dr. Eugene Moskowitz, Director, Mobility, 427 Main Street, New Rochelle, New York.

REHABILITATION and general medical hospital desires services of additional physical therapists, male or female. Near New Haven, close to Hartford and Waterbury. Fully equipped, air-conditioned physical therapy department. Policies and consultation by Dr. Thomas Hines, Physiatrist-in-Chief, Yale University, Department of Physical Medicine. Physical Therapist-in-Charge, Miss Charlotte Kinney, B.S., R.P.T. Salary open. Personal interview requested. Address Director, Box 440, Wallingford, Conn.

(continued on next page)

Classified WANT-ADS

RATES

The rate per insertion is $1.00 per line. Typewrite your advertisement carefully and count 50 characters and spaces per line.

ALL WANT-ADS MUST BE PAID FOR IN ADVANCE. Make checks or money orders payable to the American Physical Therapy Association.

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Classified WANT-ADS

NEW MONTHLY RANGE: $380-$420 for a 40-hour week. Applicants must have completed approved course in physical therapy. Challenging work in a large department under the direction of a physiatrist. Contact: Wayne County Civil Service, 628 City-County Bldg., Detroit 26, Mich., Wo 5-2750, Ext. 261.

PHYSICAL THERAPIST. Immediate opening in 340-bed general hospital located in upstate medical center. Female required. Experience not essential. Well established department. Liberal personnel policies; scheduled salary reviews. Contact Personnel Director, Syracuse Memorial Hospital, 736 Irving Ave., Syracuse 10, New York.

REGISTERED PHYSICAL THERAPISTS for staff positions—Cerebral Palsy Department. Salary $3,840-$4,790—13 working day vacation to start. Retirement, hospitalization, sick benefits. Write Lavinia M. Davidson, Director, Cerebral Palsy Department, New York State Rehabilitation Hospital, West Haverstraw, N. Y.

PHYSICAL THERAPIST needed for full time work in new well equipped office of two orthopedic surgeons. Located in one of Chicago's beautiful North Shore suburbs. Excellent starting salary, 38-hour week, paid vacation. Write Dr. Louis Scheman, 695 Roger Williams Avenue, Highland Park, Illinois.

WANTED: PHYSICAL THERAPIST for 250-bed general hospital in resort city. Have one, need two. Write Director, James Walker Memorial Hospital, Wilmington, North Carolina.

POSITIONS AVAILABLE DALLAS: Expanding physical therapy department treating in- and outpatients including general, rehabilitation, orthopedic and neurosurgical cases. Excellent working facilities, air conditioning, new equipment. Under direction of physiatrist. Higher salary for experienced physical therapist. Opportunity for working with student program. Must be graduate of approved school. Contact Mr. Jack C. Hays, Chief Physical Therapist, Baylor University Hospital, 3500 Gaston Avenue, Dallas 10, Texas.

TWO PHYSICAL THERAPISTS to work with children in a center treating neuromuscular disabilities, mainly cerebral palsy. New building, newly equipped. Affiliated with the University of Tennessee College of Medicine. For further information contact: Mrs. Robbie W. Beard, Administrator, 49 N. Dunlap, Memphis 5, Tennessee.

IMMEDIATE PLACEMENT for qualified therapist in outpatient cerebral palsy treatment center treating children with all types of cerebral palsy, under close medical supervision. Modern, air-conditioned plant; 35-hr. week; paid vacation and sick leave; time off for conventions with travel expense; good salary with annual merit increases; social security, with a retirement plan now under consideration. Apply to Philip N. Hood, Ph.D., Executive Director, Dallas Society for Crippled Children, 3212 Oak Lawn Avenue, Dallas, Texas.

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WANTED: QUALIFIED MALE or FEMALE physical therapist for 700-bed hospital. Full PM & R Program. Good salary; vacation and sick leave; retirement plan. Contact Herman J. Bearzy, Miami Valley Hospital, Dayton, Ohio.

Registered PHYSICAL THERAPISTS, male or female, to take postgraduate training in the Kenny Method of Treatment of Poliomyelitis and other neuromuscular disorders. The course includes didactic work and practical application under the direction of a complete rehabilitation team. Excellent scholarship granted to accepted applicants. Placement assured after completion of course. Write to: Personnel Director, Sister Kenny Memorial Hospital and Rehabilitation Center, El Monte, California.

WANTED: QUALIFIED physical therapist for Crippled Children's Society. Headquarters Geisinger Memorial Hospital. Excellent opportunity. For information, write Dr. Leonard F. Bush, Geisinger Memorial Hospital and Foss Clinic, Danville, Pennsylvania.

PHYSICAL THERAPIST, interested in cerebral palsy, needed at Children's Orthopedic Center. Work half-day with limited number of cerebral palsy patients; half-day with general orthopedic. Experience desirable but not necessary. Possibility for further postgraduate training. Salary and personnel policies good. Contact: Jewell Radford, P. T. Director, Mary Free Bed Guild Children's Hospital, 920 Cherry, S. E., Grand Rapids, Michigan.

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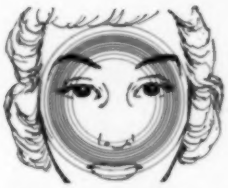

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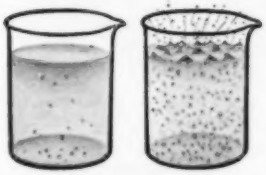

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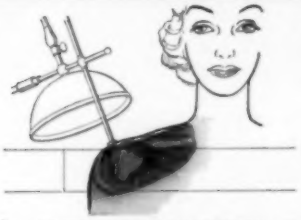

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